

DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY

GEORGE OTIS SMITH, DIRECTOR

WATER-SUPPLY PAPER 326

SURFACE WATER SUPPLY OF THE
UNITED STATES

1912

PART VI. MISSOURI RIVER BASIN

BY

W. A. LAMB, ROBERT FOLLANSBEE, AND H. D. PADGETT



WASHINGTON
GOVERNMENT PRINTING OFFICE

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SURFACE WATER SUPPLY OF THE MISSOURI RIVER BASIN, 1912.

By W. A. LAMB, ROBERT FOLLANSBEE, and H. D. PADGETT.

AUTHORIZATION AND SCOPE OF WORK.

This volume is one of a series of 12 reports presenting results of measurements of flow made on certain streams in the United States during the calendar year 1912.

The data presented in these reports were collected by the United States Geological Survey under authority implied in the organic law (20 Stat. L., p. 394), which contains the following paragraph:

Provided, That this officer [the Director] shall have the direction of the geological survey and the classification of public lands and examination of the geological structure, mineral resources, and products of the national domain.

The work was begun in 1888 in connection with special studies of water supply for irrigation.

Since the fiscal year ending June 30, 1895, successive sundry civil bills passed by Congress have carried the following item and appropriations:

For gaging the streams and determining the water supply of the United States and for the investigation of underground currents and artesian wells and for the preparation of reports upon the best methods of utilizing the water resources.

Annual appropriations for the fiscal year ending June 30—

1895.....	\$12, 500
1896.....	20, 000
1897 to 1900, inclusive.....	50, 000
1901 to 1902, inclusive.....	100, 000
1903 to 1906, inclusive.....	200, 000
1907.....	150, 000
1908 to 1910, inclusive.....	100, 000
1911 to 1913, inclusive.....	150, 000

In the execution of this work many private and State organizations have cooperated, either by furnishing data or by assisting in collecting data. Acknowledgments for cooperation of the first kind are made in connection with the description of each station affected; cooperation of the second kind is acknowledged on page 18.

Measurements of stream flow have been made at nearly 2,000 points in the United States, and also at many points in small areas

in Seward Peninsula and the Yukon-Tanana region, Alaska, and in the Hawaiian Islands. During 1912 gaging stations were maintained by the Survey and the cooperating organizations at about 1,500 points in the United States, and many discharge measurements were made at other points. In connection with this work data were also collected in regard to precipitation, evaporation, storage reservoirs, river profiles, and water power in many sections of the country, and will be made available in the regular water supply papers from time to time.

PUBLICATIONS.

A report has been prepared for each calendar year embodying the stream-flow data collected during that year. An index to the reports containing stream-flow measurements prior to 1904 has been published as Water-Supply Paper 119. Circulars are also available giving complete lists of gaging stations maintained by the Survey to date and a list of the reports relating to the water supply of the country.

Prior to 1902 gage heights and discharge measurements were published in water-supply papers or bulletins and estimates of monthly discharge in annual reports; since 1902 both classes of data have been published in water-supply papers, and they are now being published in 12 parts, as shown in the following table.

Papers on surface water supply of the United States, 1912.

Part. ^a	No.	Title.
I	321	North Atlantic coast.
II	322	South Atlantic coast and eastern Gulf of Mexico.
III	323	Ohio River basin.
IV	324	St. Lawrence River basin.
V	325	Upper Mississippi River and Hudson Bay basins.
VI	326	Missouri River basin.
VII	327	Lower Mississippi River basin.
VIII	328	Western Gulf of Mexico.
IX	329	Colorado River basin.
X	330	Great Basin.
XI	331	Pacific coast in California.
XII	332	North Pacific coast.

^a For the purpose of uniformity in the presentation of reports, a general plan has been agreed upon by the United States Reclamation Service, the United States Forest Service, the United States Weather Bureau, and the United States Geological Survey, according to which the area of the United States has been divided into 12 parts, whose boundaries coincide with natural drainage lines indicated by the parts of the report.

A list of reports containing stream-flow data is contained in the following table:

Stream-flow data in reports of the United States Geological Survey.

[A=Annual Report; B=Bulletin; WS=Water-Supply Paper.]

Report.	Character of data.	Year.
10th A, pt. 2.....	Descriptive information only.....	
11th A, pt. 2.....	Monthly discharge.....	1884 to Sept., 1890.
12th A, pt. 2.....	do.....	1884 to June 30, 1891.
13th A, pt. 3.....	Mean discharge in second-feet.....	1884 to Dec. 31, 1892.
14th A, pt. 2.....	Monthly discharge (long-time records, 1871 to 1893).....	1888 to Dec. 31, 1893.
B 131.....	Descriptions, measurements, gage heights, and rating.....	1893 and 1894.
16th A, pt. 2.....	Descriptive information only.....	
B 140.....	Descriptions, measurements, gage heights, ratings, and monthly discharge (also many data covering earlier years).....	1895.
WS 11.....	Gage heights (also gage heights for earlier years).....	1896.
18th A, pt. 4.....	Descriptions, measurements, ratings, and monthly discharge (also similar data for some earlier years).....	1895 and 1896.
WS 15.....	Descriptions, measurements, and gage heights, eastern United States, eastern Mississippi River, and Missouri River above junction with Kansas.....	1897.
WS 16.....	Descriptions, measurements, and gage heights, western Mississippi River below junction of Missouri and Platte, and western United States.....	1897.
19th A, pt. 4.....	Descriptions, measurements, ratings, and monthly discharge (also some long-time records).....	1897.
WS 27.....	Measurements, ratings, and gage heights, eastern United States, eastern Mississippi River, and Missouri River.....	1898.
WS 28.....	Measurements, ratings, and gage heights, Arkansas River and western United States.....	1898.
20th A, pt. 4.....	Monthly discharge (also for many earlier years).....	1898.
WS 35 to 39.....	Descriptions, measurements, gage heights, and ratings.....	1899.
21st A, pt. 4.....	Monthly discharge.....	1899.
WS 47 to 52.....	Descriptions, measurements, gage heights, and ratings.....	1900.
22d A, pt. 4.....	Monthly discharge.....	1900.
WS 65, 66.....	Descriptions, measurements, gage heights, and ratings.....	1901.
WS 75.....	Monthly discharge.....	1901.
WS 82 to 85.....	Complete data.....	1902.
WS 97 to 100.....	do.....	1903.
WS 124 to 135.....	do.....	1904.
WS 165 to 178.....	do.....	1905.
WS 201 to 214.....	Complete data, except descriptions.....	1906.
WS 241 to 252.....	Complete data.....	1907-8.
WS 261 to 272.....	do.....	1909.
WS 281 to 292.....	do.....	1910.
WS 301 to 312.....	do.....	1911.
WS 321 to 332.....	do.....	1912.

NOTE.—No data regarding stream flow are given in the 15th and 17th annual reports.

The table which follows gives, by years and drainage basins, the numbers of the papers on surface water supply published from 1899 to 1912. The data for any particular station will be found in the reports covering the years during which the station was maintained. For example, data for Machias River at Whitneyville, Me., 1903 to 1911, are published in Water-Supply Papers 97, 124, 165, 201, 241, 261, 281, 301, and 321, which contain records for the New England streams from 1903 to 1912.

Numbers of water-supply papers containing results of stream measurements, 1899-1912.

	1899 ^a	1900 ^b	1901	1902	1903	1904	1905	1906	1907-8	1909	1910	1911	1912
North Atlantic Coast (St. John River).....	35	47, c 48	65, 75	82	97	d 124, e 125, f 126	d 165, e 166, f 167	d 201, e 202, f 203	241	261	281	301	321
South Atlantic Coast and Eastern Gulf of Mexico (James River to the Mississippi).....	ø 35, 36	48	65, 75	ø 82, 83	ø 97, 98	f 126, 127	f 167, 168	f 203, 204	242	262	282	302	322
Ohio River basin.....	36	48, h 49	65, 75	ø 83	ø 98	128	169	205	243	263	283	303	323
St. Lawrence River and Great Lakes.....	36	49	65, 75	i 82, 83	97	129	170	206	244	264	284	304	324
Hudson Bay and Upper Mississippi River.....	36	49	f 65, 66, 75	f 83, 85	ø 98, 99, k 100	f 128, 130	171	207	245	265	285	305	325
Lower Mississippi River.....	37	49, m 50	66, 75	84	99	130, n 131	172	208	246	266	286	306	326
Western Gulf of Mexico.....	37	50	f 65, 66, 75	f 83, 84	f 98, 99	f 128, 131	f 169, 173	f 205, 209	247	267	287	307	327
Colorado River.....	ø 37, 38	50	66, 75	85	100	132	174	210	248	268	288	308	328
Great Basin.....	38, r 39	51	66, 75	85	100	133, p 134	175, q 177	211	249	269	289	309	329
Pacific Coast in California.....	38, e 39	51	66, 75	85	100	134	177	212, r 213	250, s 251	270, t 271	290	310	330
North Pacific Coast.....	38	51	66, 75	85	100	135	177, 178	213	251	271	291	311	331
								214	252	272	292	312	332

^a Rating tables and index to Water-Supply Papers 35-39 continued in Water-Supply Paper 39.^b Rating tables and index to Water-Supply Papers 47-52 and data on precipitation, wells, and irrigation in California and Utah contained in Water-Supply Paper 52.^c Wisconsin and Schuykill rivers to James River.^d New England rivers only.^e Hudson River to Delaware River, inclusive.^f Susquehanna River to Yackin River, inclusive.^g James River only.^h Scioto River.ⁱ Lake Ontario and tributaries to St. Lawrence River proper.^j Tributaries of Mississippi from east.^k Hudson Bay only.^l Gallatin River.^m Loup and Platte rivers near Columbus, Nebr., and all tributaries below junction with Platte.ⁿ Platte and Kansas rivers.^o Green and Gunnison rivers and Grand River above junction with Gunnison.^p Below junction with Gila.^q Mohave River only.^r Great Basin in California, excepting Truckee and Carson drainage basins.^s Kings and Kern rivers and south Pacific coast drainage basins.^t Rogue, Umpqua, and Siletz rivers only.

Water-supply papers and other publications of the United States Geological Survey containing data in regard to the water resources of the United States may be obtained or consulted as indicated below.

1. Copies may be obtained free of charge by applying to the Director of the Geological Survey, Washington, D. C. The edition printed for free distribution is, however, small and is soon exhausted.

2. Copies may be purchased at nominal cost from the Superintendent of Documents, Government Printing Office, Washington, D. C., who will on application furnish lists giving prices.

3. Sets of the reports may be consulted in the libraries of the principal cities in the United States.

4. Complete sets are available for consultation in the local offices of the water-resources branch of the Geological Survey, as follows:

Albany, N. Y., Room 18, Federal Building.
Atlanta, Ga., Post Office Building.
Newport, Ky., Federal Building.
St. Paul, Minn., Old Capitol Building.
Helena, Mont., Montana National Bank Building.
Denver, Colo., 302 Chamber of Commerce Building.
Salt Lake City, Utah, 421 Federal Building.
Boise, Idaho, 615 Idaho Building.
Portland, Oreg., 416 Couch Building.
San Francisco, Cal., 328 Customhouse.
Los Angeles, Cal., Federal Building.
Santa Fe, N. Mex., Capitol Building.
Honolulu, Hawaii, Kapiolani Building.

A list of the Geological Survey's publications will be sent on application to the Director of the United States Geological Survey, Washington, D. C.

DEFINITION OF TERMS.

The volume of water flowing in a stream—the “run-off” or “discharge”—is expressed in various terms, each of which has become associated with a certain class of work. These terms may be divided into two groups—(1) those which represent a rate of flow, as second-feet, gallons per minute, miner's inches, and discharge in second-feet per square mile, and (2) those which represent the actual quantity of water, as run-off in depth in inches and acre-feet. The units used in this series of reports are second-feet, second-feet per square mile, run-off depth in inches, and acre-feet. They may be defined as follows:

“Second-foot” is an abbreviation for cubic foot per second and is the unit for the rate of discharge of water flowing in a stream 1 foot wide, 1 foot deep, at a rate of 1 foot per second. It is generally used as a fundamental unit from which others are computed by the use of the factors given in the following table of equivalents.

"Second-feet per square mile" is the average number of cubic feet of water flowing per second from each square mile of area drained, on the assumption that the run-off is distributed uniformly both as regards time and area.

"Run-off (depth in inches)" is the depth to which the drainage area would be covered if all the water flowing from it in a given period were conserved and uniformly distributed on the surface. It is used for comparing run-off with rainfall, which is usually expressed in depth in inches.

An "acre-foot" is equivalent to 43,560 cubic feet and is the quantity required to cover an acre to the depth of 1 foot. The term is commonly used in connection with storage for irrigation.

CONVENIENT EQUIVALENTS.

The following is a list of convenient equivalents for use in hydraulic computations:

Table for converting discharge in second-feet per square mile into run-off in depth in inches over the area.

Discharge in second- feet per square mile.	Run-off in inches.				
	1 day.	28 days.	29 days.	30 days.	31 days.
1.....	0.03719	1.041	1.079	1.116	1.153
2.....	.07438	2.083	2.157	2.231	2.306
3.....	.11157	3.124	3.236	3.347	3.459
4.....	.14876	4.165	4.314	4.463	4.612
5.....	.18595	5.207	5.393	5.578	5.764
6.....	.22314	6.248	6.471	6.694	6.917
7.....	.26033	7.289	7.550	7.810	8.070
8.....	.29752	8.331	8.628	8.926	9.223
9.....	.33471	9.372	9.707	10.041	10.376

NOTE.—For partial month multiply the values for one day by the number of days.

Table for converting discharge in second-feet into run-off in acre-feet.

Discharge in second- feet.	Run-off in acre-feet.				
	1 day.	28 days.	29 days.	30 days.	31 days.
1.....	1.983	55.54	57.52	59.50	61.49
2.....	3.967	111.1	115.0	119.0	123.0
3.....	5.950	166.6	172.6	178.5	184.5
4.....	7.934	222.1	230.1	238.0	246.0
5.....	9.917	277.7	287.6	297.5	307.4
6.....	11.90	333.2	345.1	357.0	368.9
7.....	13.88	388.8	402.6	416.5	430.4
8.....	15.87	444.3	460.2	476.0	491.9
9.....	17.85	499.8	517.7	535.5	553.4

NOTE.—For partial month multiply the values for one day by the number of days.

1 second foot equals 40 California miner's inches (law of March 23, 1901).

1 second-foot equals 38.4 Colorado miner's inches.

1 second-foot equals 40 Arizona miner's inches.

1 second-foot equals 7.48 United States gallons per second; equals 448.8 gallons per minute; equals 646,317 gallons for one day.

1 second-foot for one year covers 1 square mile 1.131 feet or 13.572 inches deep.

1 second-foot for one year equals 31,536,000 cubic feet.

1 second-foot equals about 1 acre-inch per hour.

1 second-foot for one day equals 86,400 cubic feet.

1,000,000,000 (1 United States billion) cubic feet equals 11,570 second-feet for 1 day.

1,000,000,000 cubic feet equals 414 second-feet for one 28-day month.

1,000,000,000 cubic feet equals 399 second-feet for one 29-day month.

1,000,000,000 cubic feet equals 386 second-feet for one 30-day month.

1,000,000,000 cubic feet equals 373 second-feet for one 31-day month.

100 California miner's inches equals 18.7 United States gallons per second.

100 California miner's inches for one day equals 4.96 acre-feet.

100 Colorado miner's inches equals 2.60 second-feet.

100 Colorado miner's inches equals 19.5 United States gallons per second.

100 Colorado miner's inches for one day equals 5.17 acre-feet.

100 United States gallons per minute equals 0.223 second-foot.

100 United States gallons per minute for one day equals 0.442 acre-foot.

1,000,000 United States gallons per day equals 1.55 second-feet.

1,000,000 United States gallons equals 3.07 acre-feet.

1,000,000 cubic feet equals 22.95 acre-feet.

1 acre-foot equals 325,850 gallons.

1 inch deep on 1 square mile equals 2,323,200 cubic feet.

1 inch deep on 1 square mile equals 0.0737 second-foot per year.

1 foot equals 0.3048 meter.

1 mile equals 1.60935 kilometers.

1 mile equals 5,280 feet.

1 acre equals 0.4047 hectare.

1 acre equals 43,560 square feet.

1 acre equals 209 feet square, nearly.

1 square mile equals 2.59 square kilometers.

1 cubic foot equals 0.0283 cubic meter.

1 cubic foot of water weighs 62.5 pounds.

1 cubic meter per minute equals 0.5886 second-foot.

1 horsepower equals 550 foot-pounds per second.

1 horsepower equals 76.0 kilogram-meters per second.

1 horsepower equals 746 watts.

1 horsepower equals 1 second-foot falling 8.80 feet.

$1\frac{1}{2}$ horsepower equals about 1 kilowatt.

To calculate water power quickly: $\frac{\text{Sec.-ft.} \times \text{fall in feet}}{11} = \text{net horsepower on water wheel realizing 80 per cent of theoretical power.}$

EXPLANATION OF DATA.

For each regular current meter gaging station the following data, so far as available, are given: Description of the station, list of discharge measurements, table of daily gage heights, table of daily discharge, table of monthly and yearly discharges and run-off. For stations located at weirs or dams the gage-height table is omitted.

In addition to statements regarding the location and installation of current-meter stations, the descriptions give information in regard to any conditions which may affect the constancy of the relation of

gage height to discharge, covering such points as ice, logging, shifting channels, and backwater; also information regarding diversions which decrease the total flow at the measuring section. Statements are also made regarding the accuracy and reliability of the data.

The table of daily gage height records the daily fluctuations of the surface of the river as found from the mean of the gage readings taken each day, usually in the morning and in the evening. The gage height given in the table represents the elevation of the surface of the water above the zero of the gage. All gage heights affected by the presence of ice in the streams or by backwater from obstructions are published as recorded, with suitable footnotes. The rating table is not applicable for such periods unless the proper corrections to the gage heights are known and applied. Attention is called to the fact that the zero of the gage is placed at an arbitrary datum and has no relation to zero flow or the bottom of the river. In general the zero is located somewhat below the lowest known flow, so that negative readings shall not occur.

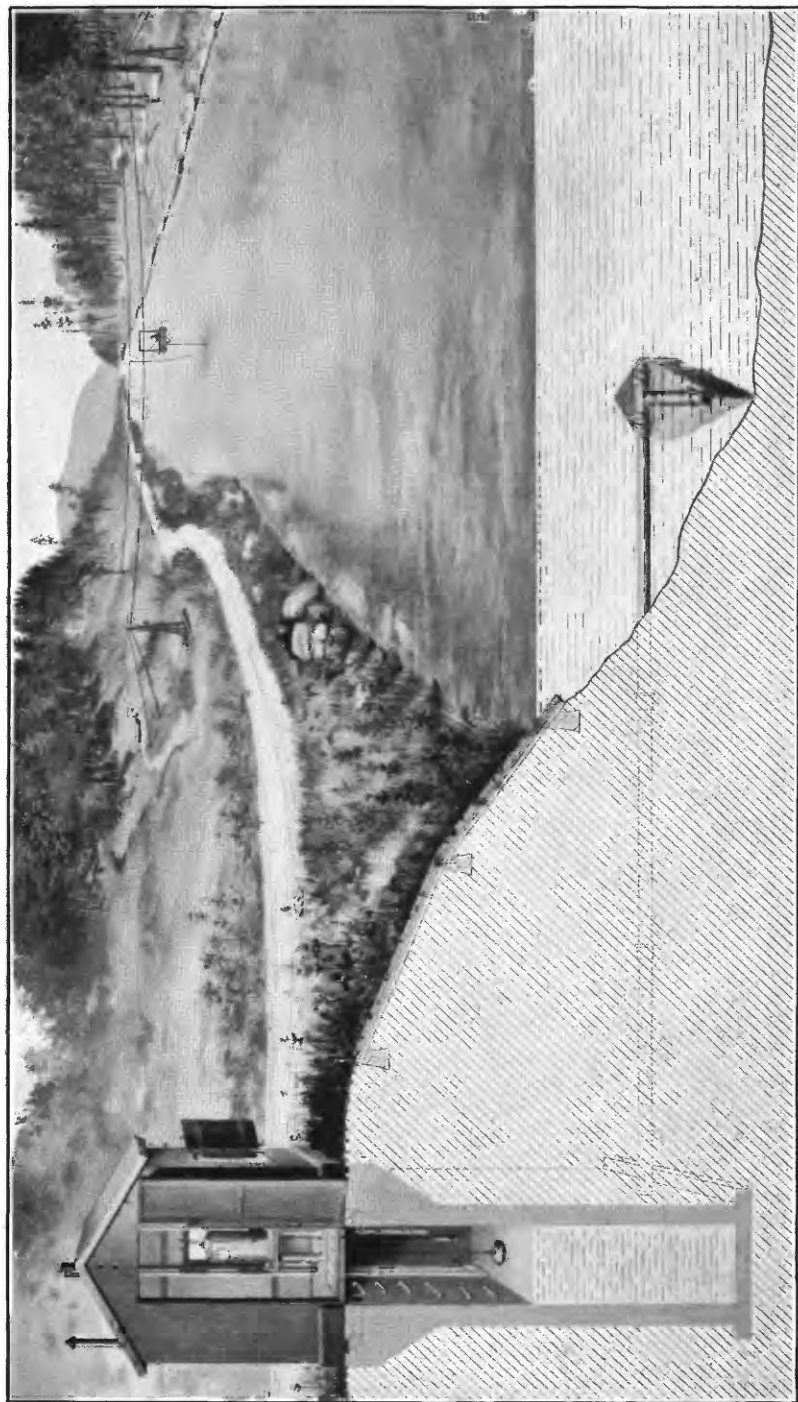
The discharge measurements and gage heights are the base data from which rating tables, daily discharge tables, and monthly discharge tables are computed.

The rating table gives, either directly or by interpolation, the discharge in second-feet corresponding to every stage of the river recorded during the period for which it is applicable. It is not published in this report, but can be determined from the tables of daily gage height and daily discharge as follows:

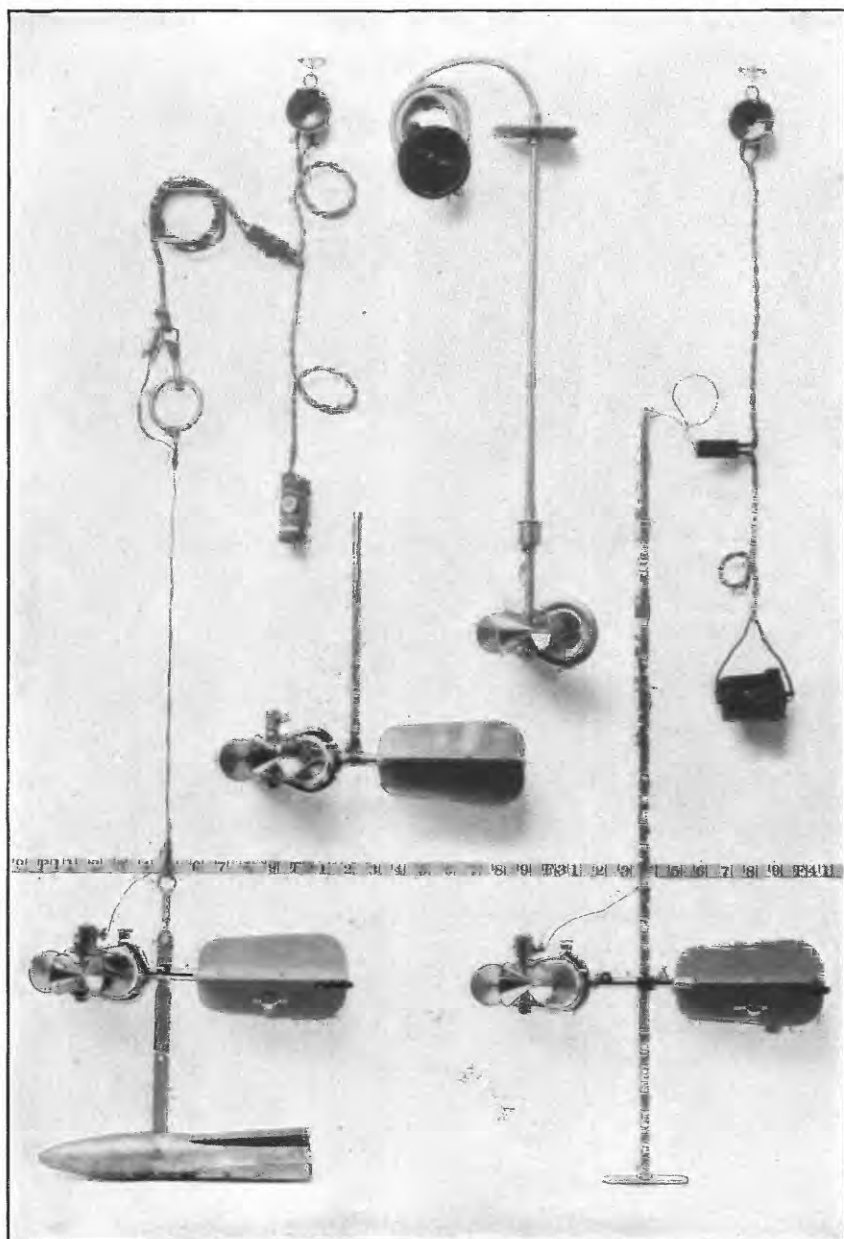
First plot the discharge measurements for the current and earlier years on cross-section paper, with gage heights in feet as ordinates and discharge in second-feet as abscissas. Then tabulate a number of gage heights taken from the daily gage-height table for the complete range of stage given and the corresponding discharges for the days selected from the daily discharge table and plot the values on cross-section paper. The last points plotted will define the rating curve used and will lie among the plotted discharge measurements. After drawing the rating curve, a table can be developed by scaling off the discharge in second-feet for each tenth foot of gage height. These values should be so adjusted that the first differences shall always be increasing or constant, except for known backwater periods.

The table of daily discharge gives the discharge in second-feet corresponding to the observed gage heights as determined from the rating tables.

In the table of monthly discharge the column headed "Maximum" gives the mean flow, as determined from the rating table, for the day when the mean gage height was highest. As the gage height is the mean for the day, it does not indicate correctly the stage when the



TYPICAL GAGING STATIONS.



PRICE CURRENT METERS.

water surface was at crest height, and the corresponding discharge was consequently larger than given in the maximum column. Likewise, in the column of "Minimum" the quantity given is the mean flow for the day when the mean gage height was lowest. The column headed "Mean" is the average flow in cubic feet for each second during the month. On this the computations for the remaining columns, which are defined on page 12, are based.

The field methods used in the collection of the data presented in this series of reports are described in the introductory sections of Water-Supply Papers 261 to 272, inclusive, "Surface water supply of the United States, 1909." Plate I shows typical gaging stations; Plate II shows current meters¹ used in the work.

ACCURACY AND RELIABILITY OF FIELD DATA AND COMPARATIVE RESULTS.

The accuracy of stream-flow data depends primarily on the natural conditions at the gaging station and on the methods and care with which the data are collected. Errors of the first group depend on the degree of permanency of channel and of permanency of the relation between discharge and stage.

Errors of the second class are due, first, to errors in observation of stage; second, to errors in measurements of flow; and, third, to errors due to misinterpretation of stage and flow data.

In order to give engineers and others information regarding the probable accuracy of the computed results, footnotes are added to the daily discharge tables, stating the probable accuracy of the rating tables used, and an accuracy column is inserted in the monthly-discharge table. For the rating tables "well defined" indicates, in general, that the rating is probably accurate within 5 per cent; "fairly well defined," within 10 per cent; "poorly defined" or "approximate" within 15 to 25 per cent. These notes are very general and are based on the plotting of the individual measurements with reference to the mean rating curve.

The accuracy column in the monthly discharge table does not apply to the maximum or minimum nor to any individual day, but to the monthly mean. It is based on the accuracy of the rating, the probable reliability of the observer, and knowledge of local conditions. In this column A indicates that the mean monthly flow is probably accurate within 5 per cent; B, within 10 per cent; C, within 15 per cent; D, within 25 per cent. Special conditions are covered by footnotes.

Even though the monthly means for any station may represent with a high degree of accuracy the quantity of water flowing past

¹ See Hoyt, J. C., and others, Use and care of current meter as practiced by the United States Geological Survey: Trans. Am. Soc. Civil Eng., vol. 66, 1910, p. 70.

the gage, the figures showing discharge per square mile and depth of run-off in inches may be subject to gross errors which result from including in the measured drainage area large noncontributing districts or omitting estimates of water diverted for irrigation or other use, and they should therefore be considered as only approximate, particularly for periods of irrigation or of low water. For these errors it is as a rule not feasible to make adequate correction.

In general the base data collected each year by the Survey engineers are published not only to comply with the law but to afford any engineer the means of examining and adjusting to his own needs the results of the computations. The table of monthly discharge is so arranged as to give only a general idea of the flow at the station and should not be used for other than preliminary estimates. The determinations of daily discharge allow more detailed studies of the variation in flow by which the period of deficiency may be determined.

It should be borne in mind that the observations in each succeeding year may be expected to throw new light on data already collected and published, and the engineer who makes use of the figures presented in these papers should verify all ratings and make such adjustments for earlier years as may seem necessary.

COOPERATION.

Work in the Missouri River basin in Montana was carried on in cooperation with the State, authority having been granted in 1911 by the State legislature, which passed a bill appropriating funds to be expended on the work of gaging streams in accordance with paragraph 3, section 2244, of the Revised Codes of 1907 of the State of Montana, which reads as follows:

The State engineer shall become conversant with the waterways of the State and the needs of the State as to irrigation matters; shall make, or cause to be made, measurements and calculations of the ordinary and flood discharge of streams, cooperating in this work as much as possible with the United States Geological Survey and the Montana Experiment Station; such measurements already made, if deemed reliable, may be adopted.

Much of this fund has been expended on work in connection with Carey Act projects.

In Wyoming also the stream gaging work was carried on in cooperation with the State represented by Mr. A. J. Parshall, State engineer. Mr. Parshall also arranged for cooperation with a number of individuals interested in the records at various stations.

Other cooperation in the Missouri River basin is acknowledged in connection with each station affected.

DIVISION OF WORK.

The work in the upper Missouri River basin in Montana was performed under the direction of W. A. Lamb, district engineer, by B. E. Jones, R. Randell, junior engineers, and C. S. Heidel, State hydrographer.

The work in North Dakota was carried on by E. F. Chandler, assistant engineer.

The field data for the Missouri River drainage basin in Colorado and central and southern Wyoming were collected under the direction of Robert Follansbee, district engineer, assisted by G. A. Gray, Raymond Richards, R. H. Fletcher, H. B. Waha, and J. L. Mathias. The work in Nebraska was under the direct supervision of Mr. D. D. Price, State engineer, who furnished all the field data.

The ratings, special estimates, and computations for stations in Colorado and central and southern Wyoming were prepared under the direction of Robert Follansbee by Raymond Richards, assisted by R. H. Fletcher.

The ratings and special estimates for stations in the upper Missouri River basin in Montana were made by W. A. Lamb and H. D. Padgett. The computations were made by H. D. Padgett, J. G. Mathers, H. J. Dean, C. L. Batchelder, M. I. Walters, and B. E. Jones.

The completed data were prepared for publication by H. D. Padgett.

The report was edited by Mrs. B. D. Wood.

GAGING STATION RECORDS.

MISSOURI RIVER PROPER.

RED ROCK RIVER BELOW RED ROCK RESERVOIR, NEAR MONIDA, MONT.

Location.—In sec. 32, T. 13 S., R. 6 W., just below the reservoir of the Red Rock Reservoir & Irrigation Co., 8 miles northeast of Monida and 15 miles east of Lima.

Records available.—July 22, 1911, to December 31, 1912. Miscellaneous measurements were made at this point on Red Rock River during the summer of 1910.

Drainage area.—About 560 square miles.

Gages.—A temporary staff gage about 300 yards downstream from the dam and a float gage in a concrete well on the right bank at a 40-foot weir, about half way between the dam and the staff gage. The records for 1911 are referred to the staff gage. The records for 1912 give the head on the weir.

Channel.—Probably permanent; bed of stream composed of coarse gravel, pebbles, and boulders; current strong.

Discharge measurements.—Made by wading.

Winter flow.—Affected by ice.

Regulation.—The dam is used to store flood waters which are released during the latter part of the irrigation season.

Accuracy.—Weir readings should be reliable and results may be considered good.

Discharge measurements of Red Rock River below Red Rock reservoir, near Monida, Mont., in 1911 and 1912.

Date.	Hydrographer.	Gage height.	Dis-charge.	Date.	Hydrographer.	Gage height.	Dis-charge.
1911.		<i>Feet.</i>	<i>Sec.-ft.</i>	1912.		<i>Feet.</i>	<i>Sec.-ft.</i>
July 12	C. S. Heidel	a 1.04	152	Apr. 24	C. S. Heidel	.67	79
Sept. 20	do.	a .81	102	24	do.	1.03	159
				24	do.	1.50	295
1912.				25	do.	1.98	489
Apr. 24	C. S. Heidel	.01	1	25	do.	2.42	699
24	do.	.38	32	Sept. 7	do.	.86	123
24	do.	.47	44	8	do.	1.15	181

a Gage height equals head on weir.

Daily gage height, in feet, of Red Rock River below Red Rock reservoir, near Monida, Mont., for 1912.

[P. V. Maxwell, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	0.27	0.27	0.26	0.26	0.76	1.85	1.04	1.10	0.85	0.88	1.73	0.99
2	.27	.27	.26	.26	1.01	1.90	.80	1.10	.85	.92	1.73	.99
3	.27	.26	.26	.26	1.40	1.90	.78	1.10	.85	.95	1.73	.99
4	.27	.25	.26	.26	1.71	2.00	.80	1.09	.85	.95	1.73	.99
5	.27	.25	.26	.26	2.00	2.05	.80	1.10	.85	.95	1.71	.99
6	.27	.25	.26	.26	2.26	2.05	.80	1.04	.86	1.01	1.71	.99
7	.27	.25	.26	.26	2.31	2.12	.87	1.02	.86	1.07	1.70	.99
8	.27	.25	.26	.26	2.33	2.18	.94	.97	1.00	1.18	1.70	.99
9	.27	.25	.26	.27	2.36	2.42	.95	.98	1.14	1.36	1.70	.98
10	.27	.25	.26	.27	2.40	2.4296	1.06	1.56	1.70	.98
11	.27	.25	.26	.27	2.44	2.45	.96	.94	.94	1.62	1.70	.67
12	.27	.25	.26	.27	2.50	2.40	.98	.94	.86	1.64	1.70	.67
13	.27	.25	.26	.27	2.65	2.40	1.02	.94	.83	1.69	1.70	.67
14	.27	.25	.27	.27	2.88	2.40	1.02	.85	.83	1.74	1.70	.67
15	.27	.25	.27	.27	2.96	2.45	1.02	.85	.83	1.75	1.70	.67
16	.27	.25	.27	.36	2.92	2.45	1.14	.85	.83	1.75	1.70	.67
17	.27	.25	.27	.50	2.80	2.42	1.13	.85	.83	1.75	1.70	.67
18	.27	.25	.27	.59	2.72	2.40	1.12	.85	.83	1.75	1.70	.67
19	.27	.25	.27	.68	2.70	2.40	1.18	.85	.83	1.75	1.70	.67
20	.27	.25	.27	.68	2.62	2.30	1.20	.85	.83	1.75	1.70	.67
21	.27	.25	.26	.75	2.60	2.30	1.20	.85	.83	1.75	1.70	.67
22	.27	.25	.26	.79	2.56	2.25	1.18	.85	.83	1.75	1.70	.38
23	.27	.25	.26	.88	2.54	2.18	1.18	.85	.83	1.75	1.70	.10
24	.27	.25	.26	1.23	2.50	2.18	1.19	.85	.83	1.75	1.70	.10
25	.27	.25	.26	1.12	2.38	1.88	1.18	.85	.83	1.75	1.45	.10
26	.27	.25	.27	.70	2.30	1.60	1.20	.85	.83	1.75	1.45	.10
27	.27	.25	.27	.70	2.20	1.45	1.18	.85	.83	1.75	1.45	.10
28	.27	.25	.26	.71	2.12	1.19	1.18	.85	.83	1.75	1.45	.10
29	.27	.25	.27	.72	2.05	1.15	1.16	.85	.83	1.75	1.45	.10
30	.2727	.74	1.95	1.15	1.15	.85	.83	1.75	1.45	.10
31	.2726	1.88	1.09	.85	1.7510

NOTE.—Gage heights give the head on the weir.

Daily discharge, in second-feet, of Red Rock River below Red Rock reservoir, near Monida, Mont., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	21	21	20	20	94	430	157	172	113	120	382	145
2	21	21	20	20	150	450	102	172	113	129	382	145
3	21	20	20	20	260	450	98	172	113	136	382	145
4	21	19	20	20	374	495	102	170	113	136	382	145
5	21	19	20	20	495	518	102	172	113	136	374	145
6	21	19	20	20	620	518	102	157	115	150	374	145
7	21	19	20	20	645	550	117	152	115	164	370	145
8	21	19	20	20	655	580	133	140	147	194	370	145
9	21	19	20	21	670	700	136	142	183	248	370	142
10	21	19	20	21	690	700	137	138	162	316	370	142

Daily discharge, in second-feet, of Red Rock River below Red Rock reservoir, near Monida, Mont., for 1912—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
11.....	21	19	20	21	710	715	138	133	133	338	370	77
12.....	21	19	20	21	740	690	142	133	115	346	370	77
13.....	21	19	20	21	818	690	152	133	109	366	370	77
14.....	21	19	21	21	944	690	152	113	109	386	370	77
15.....	21	19	21	21	988	715	152	113	109	390	370	77
16.....	21	19	21	31	966	715	183	113	109	390	370	77
17.....	21	19	21	48	900	700	180	113	109	390	370	77
18.....	21	19	21	62	856	690	178	113	109	390	370	77
19.....	21	19	21	78	845	690	194	113	109	390	370	77
20.....	21	19	21	78	801	640	200	113	109	390	370	77
21.....	21	19	20	92	790	640	200	113	109	390	370	77
22.....	21	19	20	100	770	615	194	113	109	390	370	33
23.....	21	19	20	120	760	580	194	113	109	390	370	6
24.....	21	19	20	209	740	580	197	113	109	390	370	6
25.....	21	19	20	178	680	442	194	113	109	390	278	6
26.....	21	19	21	82	640	330	200	113	109	390	278	6
27.....	21	19	21	82	590	278	194	113	109	390	278	6
28.....	21	19	20	84	550	197	194	113	109	390	278	6
29.....	21	19	21	86	518	186	189	113	109	390	278	6
30.....	21	21	90	472	186	186	113	109	390	278	6
31.....	21	20	442	170	113	390	6

NOTE.—Daily discharge determined from a well-defined rating curve.

Monthly discharge of Red Rock River below Red Rock reservoir, near Monida, Mont., for 1912.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accu- racy.
	Maximum.	Minimum.	Mean.		
January.....	21	21	21.0	1,290	B.
February.....	21	19	19.2	1,100	B.
March.....	21	20	20.4	1,250	B.
April.....	209	20	57.6	3,430	A.
May.....	988	94	651	40,000	B.
June.....	715	186	545	32,400	A.
July.....	200	98	160	9,840	A.
August.....	172	113	130	7,990	A.
September.....	183	109	117	6,960	A.
October.....	390	120	316	19,400	A.
November.....	382	278	353	21,000	A.
December.....	145	6	76.7	4,720	A.
The year.....	988	6	206	149,000	

BEAVERHEAD RIVER AT BARRATTS, MONT.

Location.—One mile above Barratts and 2 miles southwest of Dillon, Mont., in the SW. $\frac{1}{4}$ SW. $\frac{1}{4}$ sec. 20, T. 8 S., R. 9 W.

Records available.—August 12, 1907, to December 31, 1912.

Drainage area.—Not measured.

Gage.—A standard chain gage was installed on the downstream side of the bridge June 22, 1908, to replace the ordinary staff gage which had previously been used; datum of chain gage the same as that of the staff gage.

Channel.—Should not shift; rocky at the measuring section.

Discharge measurements.—Made from downstream side of the bridge.

Winter flow.—Stream remains open during the winter months.

Diversions.—A large number of diversions are made above the station. Decried water rights, aggregating 85,866 inches of water, are filed on from Lima on Red Rock River to a point 10 miles above Twin Bridges. The three largest canals diverted below the station are Canyon Creek canal, appropriating 6,000 inches; Union canal, appropriating 4,000 inches; and Beaverhead canal, diverted just north of Dillon, appropriating 5,000 inches. The Union Electric Co., of Dillon, has a canal with a carrying capacity of 6,000 inches.

Accuracy.—Results good.

Beaverhead river is called Red Rock River from its source in Red Rock Lakes to the post office of Red Rock, below which it is called the Beaverhead. The principal tributaries to the Beaverhead above the station are Grasshopper Creek, 12 miles south of Dillon; Horse Prairie Creek, 20 miles south; and Rattlesnake and Blacktail Deer creeks. Irrigation has probably been practiced in Beaverhead Valley longer than in any other valley in Montana, ditches constructed in the early seventies being still in operation.

Discharge measurements of Beaverhead River at Barratts, Mont., in 1912.

Date.	Hydrographer.	Gage height.	Discharge.
		<i>Feet.</i>	<i>Sec.-ft.</i>
Mar. 2	W. A. Lamb.....	1.00	212
Apr. 26	C. S. Heidel.....	2.00	755
June 27do.....	2.32	971
Sept. 6do.....	1.57	528

^a Some ice on control.

Daily gage height, in feet, of Beaverhead River at Barratts, Mont., for 1912.

[W. A. Meeds, observer.]

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1.....		1.3	1.5	3.2	1.8	2.0	1.2	1.3	2.2
2.....		1.3	1.5	3.0	1.8	2.4	1.2	1.3	2.1
3.....		1.8	1.5	3.0	1.7	2.8	1.3	1.3	2.2
4.....		2.1	1.6	3.2	1.6	2.1	1.6	1.4	2.1
5.....		2.0	1.7	3.3	1.5	2.1	1.7	1.5	2.2
6.....		1.55	1.8	3.3	1.4	2.1	1.5	1.65	2.1
7.....		1.55	1.9	3.4	1.4	1.95	1.45	1.7	2.2
8.....		2.0	2.0	3.5	1.4	1.85	1.4	1.8	2.1
9.....		2.2	2.2	3.7	1.35	1.9	1.4	1.8	2.2
10.....		2.1	2.4	4.9	1.3	1.85	1.4	1.8	2.1
11.....		1.9	2.6	4.9	1.2	1.7	1.4	1.8	2.2
12.....		1.7	2.6	4.3	1.1	1.5	1.4	1.9
13.....		1.55	2.4	4.0	1.0	1.45	1.4	1.8
14.....		1.45	2.4	4.1	1.0	1.4	1.4	1.9
15.....	1.0	1.4	2.4	4.4	.91	1.3	1.45	1.9
16.....	1.0	1.3	2.5	4.3	.90	1.3	1.6	1.9
17.....	1.0	1.3	2.7	4.0	.86	1.35	1.4	1.9
18.....	1.0	1.3	2.8	3.6	.85	1.45	1.4	1.9
19.....	1.0	1.4	2.9	3.3	.85	2.1	1.4	1.9
20.....	1.0	1.4	3.1	2.9	.88	2.0	1.4	1.9
21.....	1.0	1.3	3.4	2.6	.90	1.9	1.4	1.9
22.....	1.0	1.3	3.9	2.5	1.05	1.65	1.4	1.9
23.....	1.0	1.45	3.8	2.6	1.2	1.55	1.4	1.9
24.....	1.0	1.7	3.3	2.6	1.00	1.5	1.4	1.95
25.....	1.0	1.65	3.0	2.4	.94	1.45	1.4	1.95
26.....	1.0	1.8	2.9	2.3	.95	1.4	1.35	1.95
27.....	1.0	1.6	3.1	2.2	.92	1.35	1.3	2.0
28.....	1.2	1.5	3.2	2.1	.90	1.3	1.3	2.0
29.....	1.4	1.55	3.0	1.85	.95	1.2	1.3	2.0
30.....	1.3	1.6	2.9	1.7	1.0	1.2	1.3	2.2
31.....	1.15	3.2	1.05	1.2	2.1

Daily discharge, in second-feet, of Beaverhead River at Barratts, Mont., for 1912.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1		390	490	1,580	650	770	340	390	900
2		390	490	1,440	650	1,030	340	390	835
3		650	490	1,440	595	1,300	390	390	900
4		835	540	1,580	540	835	540	440	835
5		770	595	1,660	490	835	595	490	900
6		515	650	1,660	440	835	490	568	835
7		515	710	1,730	440	740	465	595	900
8		770	770	1,800	440	680	440	650	835
9		900	900	1,960	415	710	440	650	900
10		835	1,030	2,900	390	680	440	650	835
11		710	1,160	2,900	340	595	440	650	900
12		595	1,160	2,420	295	490	440	710	
13		515	1,030	2,180	255	465	440	650	
14		465	1,030	2,260	255	440	440	710	
15	255	440	1,030	2,500	219	390	465	710	
16	255	390	1,100	2,420	215	390	540	710	
17	255	390	1,230	2,180	201	415	440	710	
18	255	390	1,300	1,880	198	465	440	710	
19	255	440	1,370	1,660	198	835	440	710	
20	255	440	1,510	1,370	208	770	440	710	
21	255	390	1,730	1,160	215	710	440	710	
22	255	390	2,100	1,100	275	568	440	710	
23	255	465	2,030	1,180	340	515	440	710	
24	255	595	1,660	1,180	255	490	440	740	
25	255	568	1,440	1,030	231	465	440	740	
26	255	650	1,370	965	235	440	415	740	
27	255	540	1,510	900	223	415	390	770	
28	340	490	1,580	835	215	390	390	770	
29	440	515	1,440	680	235	340	390	770	
30	390	540	1,370	595	255	340	390	900	
31	318		1,580		275	340		835	

NOTE.—Daily discharge determined from a rating curve well defined from gage height 1.50 feet to gage height 2.50 feet and poorly defined at other stages.

Monthly discharge of Beaverhead River at Barratts, Mont., for 1912.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accu- racy.
	Maximum.	Minimum.	Mean.		
March 15-31	440	255	283	9,540	C.
April	900	390	550	32,700	A.
May	2,100	490	1,170	71,900	B.
June	2,900	595	1,640	97,600	C.
July	650	198	329	20,200	B.
August	1,300	340	603	37,100	A.
September	595	340	439	26,100	A.
October	900	390	664	40,800	A.
November 1-11	900	835	870	19,000	A.
The period				355,000	

JEFFERSON RIVER NEAR SILVERSTAR, MONT.

Location.—In sec. 23, T. 2 S., R. 6 W., at the big highway bridge on the road from Silverstar to Iron Rod, a station on a branch of the Northern Pacific Railway. The principal tributaries below the station are Pipestone and Whitetail creeks and Boulder River.

Records available.—August 11, 1910, to December 31, 1912.

Drainage area.—Not measured.

Gage.—Standard staff gage fastened to pier on downstream side.

Channel.—Gravel.

Discharge measurements.—Made from the lower side of highway bridge.

Winter flow.—Ice present.

Diversions.—Irrigation is carried on extensively from the headwaters of this stream to its mouth.

Accuracy.—Results fair.

Discharge measurements of Jefferson River near Silverstar, Mont., in 1912.

Date.	Hydrographer.	Gage height.	Discharge.
		<i>Feet.</i>	<i>Sec.-ft.</i>
Mar. 7	W. A. Lamb	a 2.60	893
Apr. 29	C. S. Heidel		3,080
June 24	do.	5.90	8,050
Sept. 4	do.	3.25	1,770

a Ice present.

Daily gage height, in feet, of Jefferson River near Silverstar, Mont., for 1912.

[C. A. Barkell, observer.]

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1.		2.75	4.0	6.2	4.9	3.4	3.0	3.3	3.3
2.		2.8	3.9	6.2	4.6	3.8	3.1	3.3	3.3
3.		2.85	3.7	6.3	4.5	3.8	3.15	3.4	3.4
4.		2.9	3.7	6.4	4.4	3.8	3.2	3.4	3.4
5.		2.9	3.6	6.6	4.2	3.7	3.2	3.45	3.45
6.		2.9	3.7	6.8	4.1	3.6	3.15	3.4	3.4
7.		2.95	3.8	6.9	4.0	3.5	3.1	3.3	3.3
8.		2.95	4.0	7.0	3.9	3.45	3.1	3.25	3.25
9.		3.0	4.4	7.1	3.9	3.4	3.15	3.2	3.2
10.		3.05	4.7	7.2	3.9	3.4	3.15	3.2	3.2
11.		3.1	4.8	7.4	3.8	3.35	3.2	3.2	3.2
12.		3.1	4.6	7.6	3.8	3.3	3.2	3.2	3.2
13.		3.15	4.7	7.6	3.7	3.3	3.2	3.2	3.2
14.		3.2	4.8	7.6	3.6	3.25	3.2	3.2	3.2
15.		3.2	4.8	7.8	3.5	3.2	3.15	3.2	3.2
16.		3.3	5.0	7.6	3.5	3.1	3.1	3.25	3.25
17.		3.35	5.1	6.9	3.45	3.0	3.1	3.3	3.3
18.		3.3	5.2	6.8	3.4	3.2	3.1	3.3	3.3
19.		3.4	5.3	6.5	3.3	3.4	3.1	3.25	3.25
20.		3.5	5.6	6.4	3.3	3.45	3.1	3.3	3.3
21.		3.5	6.0	6.3	3.3	3.4	3.1	3.3	3.3
22.		3.5	6.3	6.0	3.3	3.4	3.1	3.3	3.3
23.		3.5	6.4	5.8	3.3	3.2	3.15	3.35	3.35
24.		3.7	6.6	5.6	3.2	3.15	3.2	3.35	3.35
25.	2.5	3.9	6.4	5.8	3.1	3.1	3.2	3.4	3.4
26.	2.6	3.8	6.3	5.8	3.1	3.1	3.2	3.35	3.35
27.	2.6	3.8	6.2	5.6	3.1	3.1	3.2	3.3	3.3
28.	2.65	3.8	6.0	5.4	3.1	3.05	3.2	3.3	3.3
29.	2.7	3.8	6.2	5.1	3.1	3.0	3.2	3.3	3.3
30.	2.75	3.8	6.2		3.1	3.0	3.25	3.3	3.3
31.	2.75		6.2		3.1	3.0		3.3	3.3

Daily discharge, in second-feet, of Jefferson River near Silverstar, Mont., for 1912.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
1.		1,180	3,300	8,740	5,350	2,150	1,510	1,980
2.		1,240	3,090	8,740	4,630	2,890	1,660	1,980
3.		1,300	2,690	9,010	4,400	2,890	1,740	2,150
4.		1,370	2,690	9,280	4,170	2,890	1,820	2,150
5.		1,370	2,500	9,820	3,730	2,690	1,820	2,240
6.		1,370	2,690	10,400	3,510	2,500	1,740	2,150
7.		1,440	2,890	10,600	3,300	2,320	1,660	1,980
8.		1,440	3,300	10,900	3,090	2,240	1,660	1,900
9.		1,510	4,170	11,200	3,090	2,150	1,740	1,820
10.		1,580	4,870	11,500	3,090	2,150	1,740	1,820

Daily discharge, in second-feet, of Jefferson River near Silverstar, Mont., for 1912—Continued.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
11.....		1,660	5,110	12,000	2,890	2,060	1,820	1,820
12.....		1,660	4,630	12,600	2,890	1,980	1,820	1,820
13.....		1,740	4,870	12,600	2,690	1,980	1,820	1,820
14.....		1,820	5,110	12,600	2,500	1,900	1,820	1,820
15.....		1,820	5,110	13,100	2,320	1,820	1,740	1,820
16.....		1,980	5,600	12,600	2,320	1,660	1,660	1,900
17.....		2,060	5,850	10,600	2,240	1,510	1,660	1,980
18.....		1,980	6,100	10,400	2,150	1,820	1,660	1,980
19.....		2,150	6,360	9,550	1,980	2,150	1,660	1,900
20.....		2,320	7,140	9,280	1,980	2,240	1,660	1,980
21.....		2,320	8,200	9,010	1,980	2,150	1,660	1,980
22.....		2,320	9,010	8,200	1,980	2,150	1,660	1,980
23.....		2,320	9,280	7,660	1,980	1,820	1,740	2,060
24.....		2,690	9,820	7,140	1,820	1,740	1,820	2,060
25.....	900	3,090	9,280	7,660	1,660	1,660	1,820	2,150
26.....	1,010	2,890	9,010	7,660	1,660	1,660	1,820	2,060
27.....	1,010	2,890	8,740	7,140	1,660	1,660	1,820	1,980
28.....	1,060	2,890	8,200	6,620	1,660	1,580	1,820	1,980
29.....	1,120	2,890	8,740	5,850	1,660	1,510	1,820	1,980
30.....	1,180	2,890	8,740	5,600	1,660	1,510	1,900	1,980
31.....	1,180		8,740		1,660	1,510		1,980

NOTE.—Daily discharge determined from a fairly well defined rating curve.

Monthly discharge of Jefferson River near Silverstar, Mont., for 1912.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accu- racy.
	Maximum.	Minimum.	Mean.		
March 25-31.....	1,180	900	1,070	14,900	B.
April.....	3,090	1,180	2,010	120,000	B.
May.....	9,820	2,500	5,990	368,000	B.
June.....	13,100	5,600	9,600	571,000	B.
July.....	5,350	1,660	2,640	162,000	B.
August.....	2,890	1,510	2,030	125,000	B.
September.....	1,900	1,510	1,740	104,000	B.
October.....	2,240	1,820	1,970	121,000	B.
The period.....				1,590,000	

MISSOURI RIVER AT TOSTON, MONT.

Location.—In SW. $\frac{1}{4}$ sec. 23, T. 5 N., R. 2 E., at the highway bridge crossing Missouri River at Toston, Mont., about 25 miles below the union of Gallatin, Jefferson, and Madison rivers.

Records available.—April 5, 1910, to December 31, 1912.

Drainage area.—Not measured.

Gage.—Standard chain gage attached to downstream side of bridge.

Channel.—Rocky and permanent.

Discharge measurements.—Made from cable just above bridge.

Winter flow.—Affected by ice.

Accuracy.—Only one measurement made in 1912, but results may be considered good, owing to permanency of channel.

The only important tributary between the gaging station and the headwater forks is Sixteenmile Creek.

The following measurement was made by W. A. Lamb:

July 10, 1912: Gage height, 4.57 feet; discharge, 6,640 second-feet.

Daily gage height, in feet, of Missouri River at Toston, Mont., for 1912.

[W. B. Lorentz, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1.....	8.4	3.95	3.5	3.6	4.5	7.1	6.1	3.7	4.2	4.2	4.3	3.8
2.....	8.0	3.95	3.2	3.8	4.5	7.3	5.9	3.8	4.1	4.1	4.2	3.85
3.....	7.6	3.85	3.15	4.4	4.5	7.5	5.9	3.95	4.1	4.1	4.2	3.8
4.....	7.7	3.85	3.05	4.4	4.5	7.6	4.7	4.2	4.1	4.2	3.85
5.....	6.7	3.9	3.45	4.4	4.4	7.7	5.7	4.8	4.3	4.1	4.2	3.9
6.....	6.5	3.7	3.4	4.4	4.4	7.7	5.4	4.6	4.3	4.3	4.1	5.9
7.....	6.6	3.8	3.4	4.3	4.3	7.8	5.1	4.5	4.4	4.4	4.2	3.8
8.....	6.4	3.9	3.25	4.3	4.4	7.9	4.9	4.5	4.5	4.4	4.3	3.85
9.....	6.3	3.85	3.35	4.4	4.4	8.1	4.7	4.3	4.4	4.4	4.3	3.8
10.....	6.1	3.9	3.4	4.4	4.7	8.3	4.5	4.4	4.4	4.4	4.2	3.8
11.....	6.2	3.8	3.3	4.4	5.0	8.3	4.4	4.3	4.4	4.4	4.2	3.8
12.....	6.2	3.8	3.4	4.4	5.2	8.5	4.4	4.3	4.2	4.4	4.2	3.7
13.....	6.4	3.8	3.5	4.4	5.3	8.5	4.2	4.2	4.2	4.4	4.3	3.8
14.....	6.8	3.8	3.4	4.3	5.3	8.7	4.1	4.2	4.3	4.3	4.2	3.8
15.....	6.7	3.85	3.45	4.2	5.3	8.7	4.1	4.1	4.3	4.2	4.2	3.8
16.....	6.2	3.8	3.5	4.1	5.3	8.6	4.2	4.0	4.2	4.2	4.2	3.8
17.....	6.4	3.65	3.5	4.2	5.5	8.3	4.1	4.2	4.2	4.2	4.2	3.8
18.....	5.6	3.7	3.4	4.3	5.8	8.1	4.2	4.1	4.2	4.3	4.2	3.8
19.....	5.4	3.55	3.55	4.3	6.1	7.5	4.1	4.2	4.2	4.2	4.1	3.85
20.....	5.3	3.55	3.55	4.2	6.2	7.1	4.1	4.2	4.1	4.2	4.0	3.8
21.....	5.0	3.5	3.4	4.2	6.5	6.7	4.0	4.4	4.2	4.3	4.1	3.9
22.....	4.3	3.45	3.55	4.1	6.9	6.6	4.2	4.4	4.2	4.2	4.1	3.75
23.....	4.0	3.45	3.45	4.2	6.9	7.2	4.2	4.4	4.1	4.2	4.1	3.8
24.....	4.2	3.55	3.55	4.2	6.8	7.1	4.2	4.4	4.2	4.2	4.0	3.7
25.....	4.2	3.5	3.6	4.5	6.7	7.1	4.1	4.4	4.2	4.2	4.0
26.....	4.3	3.5	3.6	4.5	6.5	7.1	4.1	4.4	4.2	4.2	4.0	3.05
27.....	4.2	3.4	3.8	4.5	6.5	6.9	4.0	4.3	4.2	4.2	4.0	3.65
28.....	3.9	3.55	3.8	4.3	6.3	6.8	3.8	4.2	4.2	4.2	3.9	3.6
29.....	4.1	3.45	3.85	4.3	6.3	6.4	3.7	4.3	4.1	4.3	3.9	3.6
30.....	3.9	3.7	4.3	6.7	6.3	3.6	4.3	4.1	4.3	3.9	3.6
31.....	4.0	3.7	7.1	3.7	4.1	4.3	3.7

NOTE.—Relation of gage height to discharge affected by ice Jan. 1 to Feb. 18, inclusive.

Daily discharge, in second-feet, of Missouri River at Toston, Mont., for 1912.

Day.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1.....	3,110	3,380	6,310	17,900	13,100	3,660	5,230	5,230	5,580	3,950
2.....	2,360	3,950	6,310	18,900	12,200	3,550	4,890	4,890	5,230	4,100
3.....	2,240	5,940	6,310	20,000	12,200	4,400	4,890	4,890	5,230	3,950
4.....	2,020	5,940	6,310	20,500	11,800	7,080	5,230	4,890	5,230	4,100
5.....	2,980	5,940	5,940	21,100	11,300	7,480	5,580	4,890	5,230	4,250
6.....	2,850	5,940	5,940	21,100	9,990	6,690	5,580	5,580	4,890	4,250
7.....	2,850	5,580	5,580	21,600	8,710	6,310	5,940	5,940	5,230	3,950
8.....	2,480	5,580	5,940	22,200	7,890	6,310	6,310	5,940	5,580	4,100
9.....	2,720	5,940	5,940	23,200	7,080	5,580	5,940	5,940	5,580	3,950
10.....	2,850	5,940	7,080	24,300	6,310	5,940	5,940	5,940	5,230	3,950
11.....	2,600	5,940	8,300	24,300	5,940	5,580	5,940	5,940	5,230	3,950
12.....	2,850	5,940	9,130	25,400	5,940	5,580	5,230	5,940	5,230	3,660
13.....	3,110	5,940	9,560	25,400	5,230	5,230	5,230	5,940	5,580	3,950
14.....	2,850	5,580	9,560	26,500	4,890	5,230	5,580	5,580	5,230	3,950
15.....	2,980	5,230	9,560	26,500	4,890	4,890	5,580	5,230	5,230	3,950
16.....	3,110	4,890	9,560	26,000	5,230	4,560	5,230	5,230	5,230	3,950
17.....	3,110	5,230	10,400	24,300	4,890	5,230	5,230	5,230	5,230	3,950
18.....	2,850	5,580	11,700	23,200	5,230	4,890	5,230	5,580	5,230	3,950
19.....	3,240	3,240	5,580	13,100	20,000	4,890	5,230	5,230	5,230	4,890	4,100
20.....	3,240	3,240	5,230	13,500	17,900	4,890	5,230	4,890	5,230	5,230	3,950
21.....	3,110	2,850	5,230	15,000	15,900	4,560	5,940	5,230	5,580	4,890	4,250
22.....	2,980	3,240	4,890	16,900	15,400	5,230	5,940	5,230	5,230	4,890	3,800
23.....	2,980	2,980	5,230	16,900	18,400	5,230	5,940	4,890	5,230	4,890	3,950
24.....	3,240	3,240	5,230	16,400	17,900	5,230	5,940	5,230	5,230	4,560	3,660
25.....	3,110	3,380	6,310	15,900	17,900	4,890	5,940	5,230	5,230	4,560	2,840
26.....	3,110	3,380	6,310	15,000	17,900	4,890	5,940	5,230	5,230	4,560	2,020
27.....	2,850	3,950	6,310	15,000	16,900	4,560	5,580	5,230	5,230	4,560	3,520
28.....	3,240	3,950	5,580	14,000	16,400	3,950	5,230	5,230	5,230	4,250	3,380
29.....	2,980	4,100	5,580	14,000	14,500	3,660	5,580	4,890	5,580	4,250	3,380
30.....	3,660	5,580	15,900	14,000	3,380	5,580	4,890	5,580	4,250	3,380
31.....	3,660	17,900	3,660	4,890	5,580	3,660

NOTE.—Daily discharge determined from a well-defined rating curve.

Monthly discharge of Missouri River at Toston, Mont., for 1912.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accu- racy.
	Maximum.	Minimum.	Mean.		
February 19-29.....	3,240	2,850	3,100	67,600	B.
March.....	4,100	2,020	3,060	188,000	B.
April.....	6,310	3,380	5,520	328,000	B.
May.....	17,900	5,580	10,900	670,000	A.
June.....	26,500	14,000	20,500	1,220,000	A.
July.....	13,100	3,380	6,510	400,000	A.
August.....	7,480	3,660	5,530	340,000	A.
September.....	6,310	4,890	5,340	318,000	A.
October.....	5,940	4,890	5,430	334,000	A.
November.....	5,580	4,250	5,010	298,000	A.
December.....	4,250	2,020	3,800	234,000	B.
The period.....				4,400,000	

MISSOURI RIVER AT CASCADE, MONT.

Location.—In sec. 35, T 18 N., R 1 W., at the highway bridge, 100 yards from the Great Northern Railway, on the east side of the town of Cascade, Mont.

Records available.—July 20, 1902, to December 31, 1912.

Drainage area.—18,300 square miles.

Gage.—Standard chain gage attached to the bridge; datum unchanged.

Channel.—Probably permanent except at extreme flood stages.

Discharge measurements.—Made from lower side of bridge.

Winter flow.—Affected by ice.

Storage.—The Montana Power Co. has a large reservoir near Helena, between the stations at Toston and Cascade.

Accuracy.—Results good.

The most important tributaries between this station and the station at Toston, above, are Dearborn River, Little Prickly Pear Creek, and Prickly Pear Creek. Although irrigation is extensively practiced in the Missouri River valley, the water is taken from the tributary streams, the Missouri itself because of its high banks and great variation in flow and difficulty of diversion being little used.

Discharge measurements of Missouri River at Cascade, Mont., in 1912.

Date.	Hydrographer.	Gage height.	Dis- charge.
Aug. 24	R. R. Randell.....	<i>Feet.</i> 4.94	<i>Sec.-ft.</i> 5,060
Nov. 9do.....	5.24	5,760

Daily gage height, in feet, of Missouri River at Cascade, Mont., for 1912.

[W. W. Doan, observer.]

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1.....	5.1	5.8	9.1	8.2	4.1	4.8	5.0	5.0	4.8
2.....	5.0	6.0	9.3	8.0	4.3	4.6	4.9	5.1	4.8
3.....	4.9	6.1	9.3	7.7	4.3	4.6	5.0	5.4	4.6
4.....	5.2	5.9	9.6	7.6	4.5	4.8	5.0	5.2	4.8
5.....	5.3	6.0	9.8	7.4	4.9	5.3	5.4	5.2	4.8
6.....	5.6	6.0	9.9	7.4	5.7	5.1	5.3	5.2	4.8
7.....	5.6	5.9	9.8	7.0	5.7	5.1	5.0	5.1	4.8
8.....	5.6	6.0	10.0	6.8	5.5	5.0	5.2	5.4	4.8
9.....	5.8	6.4	10.1	6.0	5.6	5.2	5.4	5.4	4.8
10.....	5.7	6.3	10.1	5.4	5.4	5.3	5.3	5.3	4.7

Daily gage height, in feet, of Missouri River at Cascade, Mont., for 1912—Continued.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
11.....	5.7	6.3	10.4	5.6	5.1	5.2	5.4	5.4	4.8
12.....	5.9	6.8	10.8	5.6	5.2	4.9	5.4	5.3	4.6
13.....	5.8	6.8	10.8	5.0	5.0	4.8	5.4	5.3	4.6
14.....	5.8	6.9	10.9	5.2	5.1	4.9	5.3	5.3	4.6
15.....	5.8	7.4	11.1	4.8	5.2	5.0	5.4	5.4	4.6
16.....	5.7	7.6	11.3	4.15	5.3	4.9	5.3	5.3	4.8
17.....	5.6	7.6	11.3	4.9	5.0	5.2	5.2	5.3	4.7
18.....	5.5	7.2	11.2	4.2	4.7	4.9	5.3	5.3	4.9
19.....	5.7	7.4	10.8	4.4	5.0	4.9	5.4	5.3	5.1
20.....	5.7	7.6	10.1	4.15	4.8	4.9	5.3	5.2	5.2
21.....	5.9	8.3	9.6	4.4	4.9	5.0	5.3	5.1	5.2
22.....	5.6	9.2	9.0	4.2	5.1	4.9	5.3	5.1	5.2
23.....	5.5	9.6	8.6	4.3	4.9	5.0	5.3	5.1	5.6
24.....	5.6	9.7	8.7	4.5	5.0	5.0	5.3	5.2	5.6
25.....	5.6	9.6	8.8	4.9	4.9	5.0	5.2	5.2	7.4
26.....	5.8	9.3	8.8	5.2	4.9	4.9	5.2	5.2	6.5
27.....	5.9	9.2	8.7	5.1	5.0	5.2	5.3	4.8	7.2
28.....	5.9	8.8	8.8	5.1	4.9	5.0	5.1	5.0	6.6
29.....	5.9	8.8	8.6	4.9	4.8	5.0	4.8	4.8	6.4
30.....	5.8	8.7	8.2	4.6	4.6	5.1	4.4	5.0	6.5
31.....		8.7		4.4	4.0		4.7		5.8

NOTE.—Relation of gage height to discharge affected by ice Dec. 19-31, inclusive.

Daily discharge, in second-feet, of Missouri River at Cascade, Mont., for 1912.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1.....	5,420	7,560	20,000	16,400	2,700	4,560	5,130	5,130	4,560
2.....	5,130	8,240	20,800	15,600	3,200	4,000	4,840	5,420	4,560
3.....	4,840	8,580	20,800	14,400	3,200	4,000	5,130	6,300	4,000
4.....	5,710	7,900	22,000	14,000	3,730	4,560	5,130	5,710	4,560
5.....	6,000	8,240	22,800	13,300	4,840	6,000	6,300	5,710	4,560
6.....	6,920	8,240	23,200	13,300	7,240	5,420	6,000	5,710	4,560
7.....	6,920	7,900	22,800	11,800	7,240	5,420	5,130	5,420	4,560
8.....	6,920	8,240	23,600	11,100	6,600	5,130	5,710	6,300	4,560
9.....	7,560	9,640	24,000	8,240	6,920	5,710	6,300	6,300	4,560
10.....	7,240	9,280	24,000	6,300	6,300	6,000	6,300	6,000	4,280
11.....	7,240	9,280	25,200	6,920	5,420	5,710	6,300	6,300	4,560
12.....	7,900	11,100	26,800	6,920	5,710	4,840	6,300	6,000	4,000
13.....	7,560	11,100	26,800	5,130	5,130	4,560	6,300	6,000	4,000
14.....	7,560	11,400	27,200	5,710	5,420	4,840	6,000	6,000	4,000
15.....	7,560	13,300	28,000	4,560	5,710	5,130	6,300	6,300	4,000
16.....	7,240	14,000	28,800	2,820	6,000	4,840	6,000	6,000	4,560
17.....	6,920	14,000	28,800	4,840	5,130	5,710	5,710	6,000	4,280
18.....	6,600	12,500	28,400	2,950	4,280	4,840	6,000	6,000	4,840
19.....	7,240	13,330	26,800	3,460	5,130	4,840	6,300	6,000	
20.....	7,240	14,000	24,000	2,820	4,560	4,840	6,000	5,710	
21.....	7,900	16,800	22,000	3,460	4,840	5,130	6,000	5,420	
22.....	6,920	20,400	19,600	2,950	5,420	4,840	6,000	5,420	
23.....	6,600	22,000	18,000	3,200	4,840	5,130	6,000	5,420	
24.....	6,920	22,400	18,400	3,730	5,130	5,130	6,000	5,710	
25.....	6,920	22,000	18,800	4,840	4,840	5,130	5,710	5,710	
26.....	7,560	20,800	18,800	5,710	4,840	4,840	5,710	5,710	
27.....	7,900	20,400	18,400	5,420	5,130	5,710	6,000	4,560	
28.....	7,900	18,800	18,800	5,420	4,840	5,130	5,420	5,130	
29.....	7,900	18,800	18,000	4,840	4,560	5,130	4,560	4,560	
30.....	7,560	18,400	16,400	4,000	4,000	5,420	3,460	5,130	
31.....		18,400		3,460	2,470		4,280		

NOTE.—Daily discharge determined from a fairly well defined rating curve. Discharge Dec. 19-31 estimated at 3,500 second-feet.

Monthly discharge of Missouri River at Cascade, Mont., for 1912.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accu- racy.
	Maximum.	Minimum.	Mean.		
April.....	7,900	4,840	6,990	416,000	B.
May.....	22,400	7,560	13,800	848,000	B.
June.....	28,800	16,400	22,700	1,350,000	B.
July.....	16,400	2,320	7,020	432,000	B.
August.....	7,240	2,470	5,010	308,000	B.
September.....	6,000	4,000	5,680	302,000	B.
October.....	6,300	3,480	5,680	349,000	B.
November.....	6,300	4,560	5,700	339,000	B.
December.....	4,840	4,020	247,000	C.
The period.....	4,590,000

MISSOURI RIVER AT FORT BENTON, MONT.

Location.—In the NE. $\frac{1}{4}$ sec. 26, T. 24 N., R. 8 E., at the public highway bridge at Fort Benton, Mont.

Records available.—July 1, 1902, to April 27, 1910, gage heights recorded by United States Weather Bureau; April 28, 1910, to December 31, 1912, United States Geological Survey records, including partial estimates of run-off for the year 1910; October 1, 1911, to November 8, 1911; March 17, 1912, to July 31, 1912, and September, 1912.

Drainage area.—112,000 square miles.

Gage.—A Mott gage installed April 11, 1907, on upstream side of bridge; gage heights for 1911 and 1912 are referred to the datum used by the United States Army engineers from 1881 to 1890, which is 0.43 feet higher than that used by the United States Geological Survey in 1910.

Channel.—Probably permanent except in flood.

Discharge measurements.—Made from downstream side of bridge.

Winter flow.—Affected by ice.

Accuracy.—Results good.

Discharge measurements of Missouri River at Fort Benton, Mont., in 1911 and 1912.

Date.	Hydrographer.	Gage height.	Dis-charge.	Date.	Hydrographer.	Gage height.	Dis-charge.
1911.		<i>Feet.</i>	<i>Sec.-ft.</i>	1911.		<i>Feet.</i>	<i>Sec.-ft.</i>
Apr. 10	W. A. Lamb.....	1.52	7,240	Oct. 13	W. A. Lamb.....	0.97	5,180
10do.....	1.52	7,170				
May 31	J. C. Beebe.....	3.41	15,000	1912.			
July 9do.....	2.95	13,100	July 30	R. R. Randell.....	1.35	6,600
25do.....	.50	4,130	Nov. 16do.....	1.49	7,700
Aug. 30	R. Richards.....	.34	3,680				

Daily gage height, in feet, and discharge, in second-feet, of Missouri River at Fort Benton, Mont., for 1911.

[James P. Crane, observer.]

Day.	October.		November.		Day.	October.		November.	
	Gage height.	Dis-charge.	Gage height.	Dis-charge.		Gage height.	Dis-charge.	Gage height.	Dis-charge.
1.....	1.1	5,900	1.1	5,900	16.....	1.2	6,250		
2.....	1.1	5,900	1.1	5,900	17.....		6,250		
3.....	1.1	5,900	1.1	5,900	18.....		6,250		
4.....	1.2	6,250	1.2	6,250	19.....		5,900		
5.....	1.1	5,900	1.2	6,250	20.....		5,900		
6.....	1.1	5,900	1.1	5,900	21.....		5,900		
7.....	1.1	5,900	1.1	5,900	22.....	1.1	5,900		
8.....	1.1	5,900	1.1	5,900	23.....	1.1	5,900		
9.....	1.1	5,900			24.....	1.1	5,900		
10.....	1.1	5,900			25.....	1.1	5,900		
11.....	1.1	5,900			26.....	1.1	5,900		
12.....	1.1	5,900			27.....	1.1	5,900		
13.....	1.2	6,250			28.....	1.1	5,900		
14.....	1.2	6,250			29.....	1.1	5,900		
15.....	1.2	6,250			30.....	1.1	5,900		
					31.....	1.1	5,900		

NOTE.—Daily discharge determined from a well-defined rating curve. Discharge interpolated Oct. 17-21.

Daily gage height, in feet, of Missouri River at Fort Benton, Mont., for 1912.

[W. P. Ward, observer.]

Day.	Mar.	Apr.	May.	June.	July.	Sept.	Day.	Mar.	Apr.	May.	June.	July.	Sept.
1.....		1.7	2.3	5.7	4.6	16.....			3.9	6.4	1.6
2.....		1.7	2.3	5.8	4.4	17.....	0.9		4.3		1.2
3.....		1.6	2.3	5.8	4.3	18.....	.8	2.1	4.5		1.2
4.....			2.3	5.8	4.2	19.....	1.1	2.1	4.4		1.2
5.....			2.4	5.9	4.1	20.....	1.4		4.5	6.4	1.0
6.....		1.7	2.4	5.9	3.8	21.....	1.3		4.7	6.2	1.0
7.....		1.8	2.4	5.9	3.6	22.....	1.0		5.3	5.9	1.0
8.....		1.8	2.5		3.4	1.4	23.....	.9		5.9	5.5	
9.....		2.0	2.6		3.3	1.3	24.....	.9		6.1	5.3	
10.....		2.0	2.9		2.9	1.3	25.....	1.2		6.1	5.1	
11.....		2.1	3.3		2.2	1.3	26.....	1.5		6.1	5.0	
12.....			3.4		2.1	1.4	27.....	1.7		6.1	4.9	
13.....			3.5		2.1	1.3	28.....	2.0	2.3	6.0	4.9	
14.....			3.5			1.3	29.....	2.4	2.3	5.8	4.9	
15.....		2.2	3.6			30.....	2.1	2.3	5.7	4.6	1.35
							31.....	1.8		5.7		

Daily discharge, in second-feet, of Missouri River at Fort Benton, Mont., for 1912.

Day.	Mar.	Apr.	May.	June.	July.	Sept.	Day.	Mar.	Apr.	May.	June.	July.	Sept.
1.....		8,000	10,400	27,500	21,200	16.....		9,900	17,600	31,900	7,650
2.....		8,000	10,400	28,100	20,100	17.....	5,300	9,700	19,600	31,900	6,250
3.....		7,650	10,400	28,100	19,600	18.....	5,000	9,600	20,600	31,900	6,250
4.....		7,770	10,400	28,100	19,100	19.....	5,900	9,600	20,100	31,900	6,250
5.....		7,900	10,800	28,700	18,600	20.....	6,950	9,600	20,600	31,900	5,600
6.....		8,000	10,800	28,700	17,100	21.....	6,600	9,600	21,800	30,600	5,600
7.....		8,400	10,800	28,700	16,200	22.....	5,600	9,600	25,100	28,700	5,600
8.....		8,400	11,200	29,100	15,300	6,950	23.....	5,300	9,600	28,700	26,300	5,800
9.....		9,200	11,700	29,500	14,800	6,600	24.....	5,300	9,800	30,000	25,100	6,800
10.....		9,200	13,000	29,900	13,000	6,600	25.....	6,250	9,800	30,000	24,000	6,800
11.....		9,600	14,800	30,300	10,000	6,600	26.....	7,300	10,000	30,000	23,400	7,700
12.....		9,700	15,300	30,700	9,600	6,950	27.....	8,000	10,400	30,000	22,800	7,400
13.....		9,800	15,800	31,100	9,600	6,600	28.....	9,200	10,400	29,300	22,800	7,400
14.....		9,900	15,800	31,500	8,950	6,600	29.....	10,800	10,400	28,100	22,800	6,800
15.....		10,000	16,200	31,900	8,300	30.....	9,600	10,400	27,500	21,200	6,600
							31.....	8,400		27,500		6,600

NOTE.—Daily discharge determined from a well-defined rating curve. Discharge interpolated for days for which gage heights are missing. Discharge Sept. 1-7 estimated at 6,200 second-feet per day and Sept. 15-30 at 6,500 second-feet.

Monthly discharge of Missouri River at Fort Benton, Mont., for 1911 and 1912.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accu- racy.
	Maximum.	Minimum.	Mean.		
1911.					
October.....	6,250	5,900	5,980	368,000	B.
November 1-8.....	6,250	5,900	5,990	95,000	A.
1912.					
March 17-31.....	10,800	5,000	7,030	209,000	A.
April.....	10,400	7,650	9,330	555,000	B.
May.....	30,000	10,400	19,200	1,180,000	A.
June.....	31,900	21,200	28,300	1,680,000	B.
July.....	21,200	5,600	10,500	646,000	B.
September.....			6,480	386,000	D.
The period.....				4,660,000	

PASSAMARI¹ RIVER BASIN.

PASSAMARI RIVER NEAR ALDER, MONT.

Location.—At the private bridge on Lauterbach's ranch, about 8 miles south of Alder, Mont.

Records available.—April 27, 1911, to December 31, 1912.

Drainage area.—About 540 square miles.

Gage.—Vertical staff spiked to bridge pile 4 feet from right bank.

Channel.—Probably permanent, or only slightly shifting. Bed of stream below the gage composed of gravel and pebbles. At the gage the water is deeper and the material of the bed is finer.

Discharge measurements.—At low and ordinary stages made by wading on riffle at control 200 feet below gage; high-stage measurements made from downstream side of bridge.

Winter flow.—Affected by ice.

Accuracy.—Results good.

Discharge measurements of Passamari River near Alder, Mont., in 1912.

Date.	Hydrographer.	Gage height.	Dis- charge.
		<i>Feet.</i>	<i>Sec.-ft.</i>
Mar. 5	W. A. Lamb.....	a 4.05	133
Apr. 30	C. S. Heidel.....	4.13	177
June 25	do.....	5.35	539
Sept. 2	do.....	4.15	152

^a Ice present.

¹ This stream is known locally as Ruby Creek.

Daily gage height, in feet, of Passamari River near Alder, Mont., for 1912.

[Leo Hadel, observer.]

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1.....	3.9	4.1	6.0	4.9	4.5	4.2	4.25	4.1	4.1
2.....	3.9	4.1	6.3	4.8	4.7	4.15	4.25	4.0	4.05
3.....	4.0	4.1	6.7	4.9	4.9	4.2	4.25	4.0	4.05
4.....	4.0	4.1	6.6	4.9	4.7	4.15	4.3	4.1	4.05
5.....	4.0	4.1	6.5	4.8	4.7	4.1	4.3	4.1	4.05
6.....	4.0	4.0	6.5	4.8	4.7	4.15	4.3	4.2	4.05
7.....	4.0	4.0	6.4	4.8	4.7	4.1	4.3	4.15	4.05
8.....	4.0	4.3	6.3	4.7	4.5	4.05	4.3	4.1
9.....	4.3	4.5	6.2	4.6	4.5	4.05	4.35	4.1
10.....	4.2	4.5	6.3	4.6	4.5	4.05	4.3	4.2
11.....	4.1	4.7	5.8	4.5	4.5	4.1	4.25	4.2
12.....	4.1	4.6	5.8	4.5	4.5	4.05	4.2	4.2
13.....	4.0	4.5	6.3	4.5	4.5	4.0	4.2	4.2
14.....	4.0	4.5	6.2	4.5	4.5	4.1	4.2	4.2
15.....	4.0	4.6	6.3	4.5	4.5	4.1	4.2	4.2
16.....	4.0	5.0	5.9	4.5	4.1	4.2	4.2
17.....	4.0	5.1	5.6	4.15	4.2	4.1
18.....	4.0	5.3	5.6	4.5	4.15	4.2	4.1
19.....	4.0	5.5	5.7	4.5	4.1	4.2	4.0
20.....	4.0	5.5	5.8	4.1	4.2	4.0
21.....	4.0	5.9	5.9	4.9	4.1	4.2	4.0
22.....	4.0	5.4	5.8	4.8	4.2	4.2	4.0
23.....	4.0	5.1	5.8	4.7	4.3	4.2	4.0
24.....	4.0	4.9	5.6	4.5	4.5	4.35	4.2	4.05
25.....	4.0	4.9	5.4	4.5	4.3	4.3	4.2	4.05
26.....	4.0	5.6	5.3	4.5	4.3	4.25	4.2	4.1
27.....	4.0	5.6	5.3	4.5	4.3	4.25	4.3	4.1
28.....	4.0	5.3	5.2	4.1	4.2	4.25	4.3	4.1
29.....	4.0	5.3	5.2	4.5	4.2	4.25	4.25	4.1
30.....	4.0	6.3	5.0	4.5	4.2	4.2	4.2	4.1
31.....	6.7	4.5	4.2	4.15

Daily discharge, in second-feet, of Passamari River near Alder, Mont., for 1912.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1.....	117	166	780	372	245	165	178	140	140
2.....	117	166	895	337	305	152	178	115	128
3.....	141	166	1,060	372	372	165	178	115	128
4.....	141	166	1,020	372	305	152	190	140	128
5.....	141	166	975	337	305	140	190	140	128
6.....	141	141	975	337	305	152	190	165	128
7.....	141	141	935	337	305	140	190	152	128
8.....	141	219	895	305	245	128	190	140
9.....	219	277	856	275	245	128	204	140
10.....	192	277	895	275	245	128	190	165
11.....	166	340	704	245	245	140	178	165
12.....	166	308	704	245	245	128	165	165
13.....	141	277	895	245	245	115	165	165
14.....	141	277	856	245	245	140	165	165
15.....	141	308	895	245	245	140	165	165
16.....	141	438	742	245	245	140	165	165
17.....	141	472	628	270	245	152	165	140
18.....	141	543	628	295	245	152	165	140
19.....	141	615	666	320	245	140	165	115
20.....	141	615	704	346	245	140	165	115
21.....	141	764	742	372	245	140	165	115
22.....	141	579	704	337	245	165	165	115
23.....	141	472	704	305	245	190	165	115
24.....	141	405	628	245	245	204	165	128
25.....	141	405	552	245	190	190	165	128
26.....	141	652	514	245	190	178	165	140
27.....	141	652	514	245	190	178	190	140
28.....	141	543	477	140	165	178	190	140
29.....	141	543	477	245	165	178	178	140
30.....	141	920	407	245	165	165	165	140
31.....	1,060	245	165	152

NOTE.—Daily discharge determined from two fairly well-defined rating curves. The first was used to May 30 and the second May 31 and after. Discharge interpolated for days for which gage heights are missing.

Monthly discharge of Passamari River near Alder, Mont., for 1912.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accu- racy.
	Maximum.	Minimum.	Mean.		
April.....	219	117	145	8,630	B.
May.....	1,060	141	422	25,900	B.
June.....	1,060	407	748	44,500	B.
July.....	372	140	287	17,600	B.
August.....	372	165	243	14,900	B.
September.....	204	115	153	9,100	B.
October.....	204	152	174	10,700	B.
November.....	165	115	140	8,330	B.
December 1-7.....	140	128	130	1,860	B.
The period.....				142,000	

BIGHOLE RIVER BASIN.**BIGHOLE RIVER NEAR DEWEY, MONT.**

Location.—In sec. 36, T. 1N., R. 11 W., at Young's bridge, 4 miles above Dewey and 11 miles above Divide, Mont.; a few miles below the mouth of Wise River.

Records available.—September 15 to December 31, 1912.

Drainage area.—Not measured.

Gage.—Staff fastened to southeast piling of bridge on downstream side.

Channel.—Rocky and clean; nonshifting

Discharge measurements.—Made from bridge.

Winter flow.—Affected by ice.

Diversions.—Water is diverted from this stream for irrigation.

Artificial control.—A large hydroelectric power plant is in operation about 8 miles below the station.

Accuracy.—Results excellent.

Discharge measurements of Bighole River near Dewey, Mont., in 1912.

Date.	Hydrographer.	Gage height.	Dis- charge.
		<i>Feet.</i>	<i>Sec.-feet.</i>
Mar. 3	W. A. Lamb.....	2.23	260
Apr. 27	C. S. Heidel.....	4.80	1,810
June 28	do.....	7.03	4,980
Sept. 5	do.....	4.05	1,140

Daily gage height, in feet, of Bighole River near Dewey, Mont., for 1912.

[W. T. Neal, observer.]

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1.....		2.2	4.6	7.6	6.8	4.0	3.0	3.1	2.9
2.....		2.2	4.6	7.6	6.7	4.3	3.2	3.1	2.85
3.....	2.2	2.3	4.5	7.8	6.6	4.8	3.5	3.1	2.9
4.....	2.1	2.4	4.5	8.0	5.9	4.7	3.6	3.1	3.0
5.....	2.2	2.6	4.6	8.2	5.7	4.6	4.0	3.15	3.15
6.....	2.2	2.65	4.5	8.4	5.5	4.4	3.7	3.2	3.1
7.....	2.25	2.8	4.5	8.5	5.4	4.2	3.6	3.25	2.9
8.....	2.15	2.8	4.7	8.6	5.2	4.1	3.35	3.35	2.9
9.....	2.2	2.95	5.6	8.8	5.2	4.3	3.2	3.4	2.85
10.....	2.25	3.1	6.7	9.0	5.0	4.1	3.1	3.4	

Daily gage height, in feet, of Bighole River near Dewey, Mont., for 1912—Continued.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
11.....	2.2	2.3	6.5	9.2	4.8	3.9	3.1	3.4
12.....	2.15	3.5	6.5	9.4	4.6	3.7	3.2	3.35
13.....	2.15	3.8	6.7	9.2	4.3	3.5	3.25	3.35
14.....	2.2	4.0	6.4	9.0	4.5	3.4	3.3	3.3
15.....	2.15	4.1	6.4	8.7	4.5	3.4	3.25	3.3
16.....	2.2	4.4	6.6	8.5	4.4	3.35	3.2	3.3
17.....	2.0	4.2	6.7	8.4	4.4	3.3	3.2	3.3
18.....	2.0	4.5	6.9	8.0	4.4	3.4	3.2	3.3
19.....	2.0	4.6	7.0	7.6	4.4	3.5	3.2	3.3
20.....	2.05	4.2	7.6	7.1	4.3	3.5	3.15	3.3
21.....	2.05	4.5	7.8	7.0	4.4	3.4	3.1	3.25
22.....	2.05	5.1	7.9	7.2	4.4	3.3	3.1	3.2
23.....	2.05	4.8	8.1	7.1	4.5	3.25	3.1	3.15
24.....	2.1	4.6	8.1	7.4	4.4	3.2	3.1	3.1
25.....	2.1	4.8	7.8	7.2	4.2	3.1	3.1	3.2
26.....	2.15	4.7	7.5	7.2	4.1	3.05	3.2	3.2
27.....	2.15	4.7	7.4	7.1	4.0	3.0	3.2	3.3
28.....	2.15	4.7	7.4	7.1	3.9	2.95	3.1	3.3
29.....	2.2	4.8	7.5	7.0	3.8	2.85	3.1	3.2
30.....	2.2	4.9	7.5	7.0	3.8	2.8	3.1	3.1
31.....	2.2	7.5	3.7	2.85	2.9

Daily discharge, in second-feet, of Bighole River near Dewey, Mont., for 1912.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1.....	250	250	1,620	6,090	4,590	1,130	560	605	515
2.....	250	250	1,620	6,090	4,420	1,360	655	605	492
3.....	250	280	1,530	6,390	4,250	1,810	810	605	515
4.....	220	315	1,530	6,750	3,160	1,720	870	605	560
5.....	250	390	1,620	7,110	2,880	1,620	1,130	630	630
6.....	250	410	1,530	7,470	2,600	1,440	935	655	605
7.....	265	470	1,530	7,650	2,460	1,280	870	680	515
8.....	235	470	1,720	7,830	2,210	1,200	730	730	515
9.....	250	538	2,740	8,190	2,210	1,360	655	755	492
10.....	265	605	4,420	8,550	2,000	1,200	605	755
11.....	250	705	4,080	8,910	1,810	1,060	605	755
12.....	235	810	4,080	9,270	1,620	935	655	730
13.....	235	1,000	4,420	8,910	1,360	810	680	730
14.....	250	1,130	3,920	8,550	1,530	755	705	705
15.....	235	1,200	3,920	8,010	1,530	755	680	705
16.....	250	1,440	4,250	7,650	1,440	730	655	705
17.....	190	1,280	4,420	7,470	1,440	705	655	705
18.....	190	1,530	4,770	6,750	1,440	755	655	705
19.....	190	1,620	4,950	6,090	1,440	810	655	705
20.....	205	1,280	6,090	5,130	1,360	810	630	705
21.....	205	1,530	6,390	4,950	1,440	755	605	680
22.....	205	2,100	6,570	5,310	1,440	705	605	655
23.....	205	1,810	6,930	5,130	1,530	680	605	630
24.....	220	1,620	6,930	5,670	1,440	655	605	605
25.....	220	1,810	6,390	5,310	1,280	605	605	655
26.....	235	1,720	5,850	5,310	1,200	582	655	655
27.....	235	1,720	5,670	5,130	1,130	560	655	705
28.....	235	1,720	5,670	5,130	1,060	538	605	705
29.....	250	1,810	5,850	4,950	1,000	492	605	655
30.....	250	1,900	5,850	4,950	1,000	470	605	605
31.....	250	5,850	935	492	515

NOTE.—Daily discharge determined from a well-defined rating curve. Discharge Mar. 1 and 2, estimated at 250 second-feet.

Monthly discharge of Bighole River near Dewey, Mont., for 1912.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accu- racy.
	Maximum.	Minimum.	Mean.		
March.....	265	190	233	14,300	A.
April.....	2,100	250	1,120	66,600	A.
May.....	6,930	1,530	4,280	263,000	A.
June.....	9,270	4,950	6,680	397,000	A.
July.....	4,590	935	1,910	117,000	A.
August.....	1,810	470	928	57,100	A.
September.....	1,130	560	685	40,800	A.
October.....	1,755	515	672	41,300	A.
November 1-9.....	630	492	538	9,600	A.
The period.....				1,010,000	

BOULDER RIVER BASIN.**MUSKRAT CREEK NEAR BOULDER, MONT.**

Location.—In sec. 6, T. 6 N., R. 3 W., 1,000 feet above Boulder Nursery, near Boulder, Mont.

Records available.—April 27 to December 31, 1912.

Drainage area.—Not measured.

Gage.—Staff gage fastened to a flume above a weir. Gage heights give the head on the weir.

Channel.—Flume.

Discharge measurements.—The flow of the stream is measured by a weir, sharp crested and with end contractions. The weir is 4.85 feet long. The gage is located 2.5 feet upstream from the crest. The daily discharge was obtained by use of Francis's formula for weir end contractions. The velocity of approach is about 1 foot per second at a gage height of 0.3 foot.

Winter flow.—Affected by ice.

Artificial control.—There is no regulation or diversion above the station; the flow of the stream is used for irrigation.

Accuracy.—Results should be very good.

Daily gage height, in feet, of Muskrat Creek near Boulder, Mont., for 1912.

[C. O. Hansen, observer.]

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1.....		0.24	0.60	0.71	0.41	0.26	0.36	0.28
2.....		.24	.62	.66	.40	.27	.3627
3.....		.22	.62	.64	.44	.36	.3428
4.....		.24	.59	.62	.39	.48	.4028
5.....		.24	1.10	.60	.35	.34	.3627
6.....		.26	1.32	.58	.35	.31	.36	0.34	.27
7.....		.37	1.22	.62	.36	.28	.36	.34	.27
8.....		.49	1.22	.60	.34	.28	.37	.34	.27
9.....		.54	1.41	.56	.32	.28	.38	.37	.27
10.....		.46	1.19	.52	.32	.28	.38	.34	.27
11.....		.49	1.16	.50	.30	.28	.36	.32	.27
12.....		.45	1.14	.49	.30	.28	.37	.32	.27
13.....		.46	1.16	.48	.29	.29	.38	.32	.27
14.....		.52	1.05	.48	.28	.30	.40	.32	.27
15.....		.66	1.01	.46	.28	.29	.42	.32
16.....		.73	.96	.44	.29	.30	.43	.30
17.....		.74	.95	.44	.28	.32	.46	.30
18.....		.76	.88	.44	.39	.36	.40	.30
19.....		.73	.85	.43	.38	.39	.38	.30
20.....		.91	.84	.42	.34	.36	.38	.30

Daily gage height, in feet, of Muskrat Creek near Boulder, Mont., for 1912—Continued.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
21.....		0.80	0.84	0.42	0.30	0.35	0.30	0.30
22.....		.70	.80	.42	.30	.37	.36	.30
23.....		.60	.79	.46	.28	.36	.36	.30
24.....		.60	.74	.40	.26	.34	.34	.30
25.....		.61	.72	.38	.26	.33	.34	.30
26.....		.58	.68	.37	.25	.32	.33	.30
27.....	0.25	.67	.66	.36	.26	.3230
28.....	.24	.66	.62	.36	.26	.32	.34	.28
29.....	.24	.60	.60	.34	.27	.32	.34	.28
30.....	.25	.59	.60	.34	.28	.34	.34	.28
31.....		.5934	.2734

Daily discharge, in second-feet, of Muskrat Creek near Boulder, Mont., for 1912.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1.....		1.9	7.3	9.4	4.2	2.1	3.4	3.2	2.4
2.....		1.9	7.7	8.4	4.0	2.2	3.4	3.2	2.2
3.....		1.7	7.7	8.0	4.6	3.4	3.2	3.2	2.4
4.....		1.9	7.1	7.7	3.9	5.3	4.0	3.2	2.4
5.....		1.9	17.8	7.3	3.3	3.2	3.4	3.2	2.2
6.....		2.1	23.2	7.0	3.3	2.8	3.4	3.2	2.2
7.....		3.6	20.7	7.7	3.4	2.4	3.4	3.2	2.2
8.....		5.4	20.7	7.3	3.2	2.4	3.6	3.2	2.2
9.....		6.3	25.5	6.6	2.9	2.4	3.7	3.6	2.2
10.....		4.9	19.9	5.9	2.9	2.4	3.7	3.2	2.2
11.....		5.4	19.2	5.6	2.6	2.4	3.4	2.9	2.2
12.....		4.8	18.7	5.4	2.6	2.4	3.6	2.9	2.2
13.....		4.9	19.2	5.3	2.5	2.5	3.7	2.9	2.2
14.....		5.9	16.6	5.3	2.4	2.6	4.0	2.9	2.2
15.....		8.4	15.7	4.9	2.4	2.5	4.3	2.9
16.....		9.8	14.6	4.6	2.5	2.6	4.5	2.6
17.....		10.0	14.4	4.6	2.4	2.9	4.9	2.6
18.....		10.4	12.8	4.6	3.9	3.4	4.0	2.6
19.....		9.8	12.2	4.5	3.7	3.9	3.7	2.6
20.....		13.5	12.0	4.3	3.2	3.4	3.7	2.6
21.....		11.2	12.0	4.3	2.6	3.3	2.6	2.6
22.....		9.2	11.2	4.3	2.6	3.6	3.4	2.6
23.....		7.3	11.0	4.9	2.4	3.4	3.4	2.6
24.....		7.3	10.0	4.0	2.1	3.2	3.2	2.6
25.....		7.5	9.6	3.7	2.1	3.0	3.2	2.6
26.....		7.0	8.8	3.6	2.0	2.9	3.0	2.6
27.....	2.0	8.6	8.4	3.4	2.1	2.9	3.1	2.6
28.....	1.9	8.4	7.7	3.4	2.1	2.9	3.2	2.4
29.....	1.9	7.3	7.3	3.2	2.2	2.9	3.2	2.4
30.....	2.0	7.1	7.3	3.2	2.4	3.2	3.2	2.4
31.....		7.1	3.2	2.2	3.2

NOTE.—See station description for method of computing daily discharge. Discharge interpolated Nov. 1-5.

Monthly discharge of Muskrat Creek near Boulder, Mont., for 1912.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accu- racy.
	Maximum.	Minimum.	Mean.		
May.....	13.5	1.7	6.53	402	B.
June.....	25.5	7.1	13.5	803	B.
July.....	9.4	3.2	5.34	328	B.
August.....	4.6	2.0	2.86	176	A.
September.....	5.3	2.1	2.95	176	A.
October.....	4.9	2.6	3.54	218	A.
November.....	3.6	2.4	2.84	169	A.
December 1-14.....	2.4	2.2	2.24	62	A.
The period.....				2,330	

GALLATIN RIVER BASIN.

WEST GALLATIN RIVER NEAR SALESVILLE, MONT.

Location.—On highway bridge 4 miles above Salesville, Mont., just below mouth of canyon. Above the station Spanish Creek is the most important tributary.

Records available.—July 18, 1895, to December 31, 1905; August 9, 1910, to December 31, 1912.

Drainage area.—860 square miles.

Gage.—Standard chain, boxed and fastened near middle of bridge on upstream side; datum unchanged.

Channel.—Bed of stream is of gravel and small bowlders, and will not shift.

Discharge measurements.—Made from the lower side of the highway bridge.

Diversions.—Irrigation is practiced extensively on this stream, and practically the entire low-water flow of the river is appropriated.

Accuracy.—Results uncertain, as no open-water measurements were made during the year.

The following discharge measurement was made by W. A. Lamb:

March 1, 1912: Gage height, 2.92 feet (ice present); discharge, 245 second-feet.

Daily gage height, in feet, of West Gallatin River near Salesville, Mont., for 1912.

[C. L. Crew, observer.]

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1.....		3.1	3.0	6.0	5.5	4.2	3.5	3.2	3.5
2.....		3.2	3.1	6.3	5.3	4.2	3.6	3.3	3.5
3.....		3.5	3.1	6.2	5.1	4.4	3.6	3.3	3.4
4.....		3.2	3.0	6.5	5.1	4.3	3.5	3.4	3.4
5.....		3.2	3.2	6.7	5.0	4.1	3.5	3.6	3.4
6.....		3.1	3.2	6.6	4.9	4.1	3.5	3.6	3.3
7.....		3.0	3.2	6.7	4.9	4.0	3.4	3.5	3.3
8.....		3.1	3.3	7.1	4.8	3.9	3.5	3.6	3.3
9.....		3.2	3.3	7.1	4.6	3.9	3.5	3.5	3.1
10.....		3.2	3.3	7.1	4.6	3.9	3.4	3.5
11.....		3.3	3.6	7.2	4.6	3.8	3.3	3.4
12.....		3.2	3.6	7.2	4.6	3.7	3.4	3.5
13.....		3.2	3.6	7.2	4.5	3.7	3.4	3.4
14.....		3.0	3.5	6.8	4.8	3.7	3.3	3.3
15.....		3.1	3.7	6.2	4.6	3.6	3.4	3.4
16.....		3.2	4.1	5.8	4.4	3.7	3.4	3.4
17.....		3.1	4.2	5.9	4.4	3.7	3.3	3.2
18.....		3.1	4.7	5.9	4.4	3.6	3.4	3.3
19.....		3.0	4.9	5.9	4.3	3.7	3.4	3.3
20.....		2.9	5.0	6.1	4.4	3.7	3.4	3.3
21.....		3.0	5.1	6.6	4.4	3.6	3.3	3.2
22.....		3.0	4.7	6.7	4.4	3.5	3.4	3.3
23.....		3.0	4.5	6.5	4.3	3.5	3.4	3.5
24.....	2.8	2.9	4.3	6.6	4.3	3.5	3.3	3.4
25.....	2.7	3.0	4.4	6.6	4.2	3.4	3.4	3.5
26.....	2.8	3.0	5.0	6.5	4.0	3.5	3.4	3.5
27.....	2.8	2.9	4.9	6.5	4.1	3.7	3.3	3.4
28.....	2.8	3.0	5.0	6.1	4.0	3.6	3.4	3.5
29.....	2.9	3.0	5.0	5.8	3.9	3.6	3.3	3.5
30.....	3.0	2.9	6.6	5.7	4.0	3.6	3.3	3.5
31.....	3.0	5.8	4.0	3.6	3.5

Daily discharge, in second-feet, of West Gallatin River near Salesville, Mont., for 1912.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1.		380	335	3,700	2,850	1,140	590	425	590
2.		425	380	4,240	2,550	1,140	655	475	590
3.		590	380	4,060	2,250	1,340	655	475	530
4.		425	335	4,600	2,250	1,240	590	530	530
5.		425	425	4,960	2,100	1,060	590	655	530
6.		380	425	4,780	1,960	1,060	590	655	475
7.		335	425	4,960	1,960	965	530	590	475
8.		380	475	5,680	1,830	880	590	655	475
9.		425	475	5,680	1,570	880	590	590	380
10.		425	475	5,680	1,570	880	530	590	
11.		475	655	5,860	1,570	800	475	530	
12.		425	655	5,860	1,570	725	530	590	
13.		425	655	5,860	1,450	725	530	530	
14.		335	590	5,140	1,830	725	475	475	
15.		380	725	4,060	1,570	655	530	530	
16.		425	1,060	3,350	1,340	725	530	530	
17.		380	1,140	3,520	1,340	725	475	425	
18.		380	1,700	3,520	1,340	655	530	475	
19.		335	1,960	3,520	1,240	725	530	475	
20.		295	2,100	3,880	1,340	725	530	475	
21.		335	2,250	4,780	1,340	655	475	425	
22.		335	1,700	4,960	1,340	590	530	475	
23.		335	1,450	4,600	1,240	590	530	590	
24.		265	1,240	4,780	1,240	590	475	530	
25.		240	335	1,340	1,140	530	530	590	
26.	265	335	2,100	4,600	965	590	530	590	
27.	265	295	1,960	4,600	1,060	725	475	530	
28.	265	335	2,100	3,880	965	655	530	590	
29.	295	335	2,100	3,350	880	655	475	590	
30.	335	295	4,780	3,180	965	655	475	590	
31.	335		3,350		965	655		590	

NOTE.—Daily discharge based on the 1911 rating curve. No measurements made in 1912 at time of open channel. Results somewhat uncertain.

Monthly discharge of West Gallatin River near Salesville, Mont., for 1912.

[Drainage area, 860 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
March 24-31	335	240	283	0.329	0.10	4,500	C.
April	590	295	376	.437	.49	22,400	C.
May	4,780	335	1,280	1.49	1.72	78,700	C.
June	5,860	3,180	4,550	5.29	5.90	271,000	C.
July	2,850	880	1,530	1.78	2.05	94,100	C.
August	1,340	530	795	.924	1.07	48,900	C.
September	655	475	536	.623	.70	31,900	C.
October	655	425	541	.629	.73	33,300	C.
November 1-9	590	380	508	.591	.20	9,070	C.
The period						594,000	

CROW CREEK BASIN.

CROW CREEK NEAR TOWNSEND, MONT.

Location.—In the SE. $\frac{1}{4}$ sec. 5, T. 6 N., R. 1 W., about one-half mile from Eagle Creek ranger station on Eagle Creek, 1,000 feet above the mouth of Eagle Creek and 150 feet below the crossing.

Records available.—Gage heights January 5, 1912 to December 31, 1912. A gaging station was established by the United States Geological Survey on this creek about 5 miles below this one April 1, 1901. There have never been any gage readings at the old station. The United States Geological Survey and many private companies have made miscellaneous measurements on this creek.

Drainage area.—33 square miles.

Gage.—Vertical staff.

Channel.—Gravel, irregular and possibly shifting.

Discharge measurements.—Made by wading or from the bridge.

Winter flow.—Seriously affected by ice.

Diversion.—Above this point water is used for placer mining. Below, the entire normal flow is used for irrigation on the land adjoining the Missouri River and for placer work along this creek.

Artificial control.—None.

Data inadequate for estimates of discharge.

The following discharge measurement was made by B. E. Jones:

January 5, 1912: Gage height, 1.25 feet (ice present); discharge, 6.8 second-feet.

Daily gage height, in feet, of Crow Creek near Townsend, Mont., for 1912.

[John Frey, observer.]

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1		1.25				1.17		1.28
2			2.9					
3			2.8	1.65		1.30		1.30
4		1.15						
5		1.2			1.30	1.28		1.25
6			2.5	1.6	1.32	1.25		
7					1.34			
8	1.5		2.45	1.6				
9			2.4		1.25			1.25
10	1.8	1.85						
11		1.80	2.6		1.25			
12		1.78	2.65					1.25
13				1.45	1.25			
14			2.3					
15	1.3				1.2			1.20
16			2.1	1.4				1.22
17	1.1	2.30	1.95		1.2			
18		2.4		1.4				
19	1.10							
20			1.8	1.4				
21			1.85				1.35	
22	1.09	2.8		1.4			1.35	
23			1.85	1.45				
24		2.7		1.4	1.17		1.32	
25	1.12			1.35	1.17		1.35	
26			1.8	1.3				
27			1.75	1.3				
28	1.18	2.5		1.3			1.8	
29	1.25		1.65					
30		3.1	1.6	1.3	1.17			
31				1.3	1.17			

DEEP CREEK BASIN.**DEEP CREEK NEAR TOWNSEND, MONT.**

Location.—In sec. 29, T. 7 N., R. 4 E., Montana principal meridian, unsurveyed, 12 miles from Townsend, directly back of the ranger station in the canyon of Deep Creek, approximately 10 miles above the confluence with the Missouri River.

Records available.—October 9, 1910, to June 30, 1911, and fragmentary gage heights in 1912.

Drainage area.—89 square miles.

Gage.—Vertical staff.

Channel.—Small rock; probably permanent.

Discharge measurements.—Made by wading.

Winter flow.—Affected by ice.

Diversion.—Small quantities of water are diverted for irrigation on small flats above the gage. Below the gage nearly the entire flow is diverted, or will eventually be diverted, for irrigation on the land adjoining this creek and Missouri River.

Data inadequate for estimates of discharge.

Daily gage height, in feet, of Deep Creek near Townsend, Mont., for 1912.

[Percy B. Evans, observer.]

Day.	Apr.	May.	June.	Oct.	Nov.	Dec.	Day.	Apr.	May.	June.	Oct.	Nov.	Dec.
1.....					0.64	0.66	16.....		1.46	1.70		0.78	0.64
2.....			1.85		.64	.65	17.....		1.68	1.63		.78	
3.....			1.82		.64	.65	18.....		1.52			.77	
4.....			1.85		.64	.64	19.....			1.52	0.84	.76	.64
5.....			1.80		.64	.64	20.....			1.48	.84	.76	.64
6.....			1.80		.64	.64	21.....	1.00		1.48	.84	.74	.64
7.....			1.76		.64	.65	22.....	1.00		1.48	.82	.74	
8.....			1.76		.64	.66	23.....	1.00			.81	.74	
9.....			1.76		.90	.66	24.....	1.05				.72	
10.....			1.76	0.92	.99	.66	25.....	1.05				.72	
11.....			1.72	.92	.96	.64	26.....	1.08			.77	.70	
12.....		1.54	1.72	.92	.94		27.....	1.15			.72	.66	
13.....		1.52	1.72	.91	.93	.64	28.....				.70	.66	
14.....		1.50	1.70	.91	.88	.64	29.....				.68	.66	
15.....	1.46	1.70	.90	.90	.85	.64	30.....				.64	.66	
							31.....				.64		

PRICKLY PEAR CREEK BASIN.**PRICKLY PEAR CREEK NEAR CLANCY, MONT.**

Location.—In sec. 33, T. 9 N., R. 3 W., on the private wagon bridge back of the ranch buildings on the Stafford ranch and just to the right of the Great Northern Railway, about 1 mile below Clancy and just below the mouth of Lump Gulch Creek. This station was established to take the place of the one previously maintained about a mile below. The same amount of water passes both stations.

Records available.—July 15, 1908, to June 30, 1909 (old site); July 12, 1910, to December 31, 1912 (present site).

Drainage area.—Not measured.

Gage.—Staff nailed to bridge abutment, right bank, on downstream side.

Discharge measurements.—Made from the wagon bridge or by wading.

Winter flow.—Ice is common in extreme cold weather.

Diversions.—There are few diversions above this station, but the entire summer flow is appropriated and used for irrigation below the station.

Accuracy.—Results good.

Discharge measurements of Prickly Pear Creek near Clancy, Mont., in 1912.

Date	Hydrographer.	Gage height.	Dis-charge.
		<i>Feet.</i>	<i>Sec.-ft.</i>
Feb. 22	B. E. Jones.....	1.29	27
May 16do.....	2.50	154
July 7	W. A. Lamb.....	2.01	87
Sept. 19	R. R. Randell.....	1.58	45

Daily gage height, in feet, of Prickly Pear Creek near Clancy, Mont., for 1912.

[H. Y. Barrow, observer.]

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
1.....		1.54	1.81	2.37	2.05	1.57	1.60
2.....		1.65	1.84	2.50	2.04	1.59	1.62
3.....		1.91	1.90	2.5	2.06	1.67	1.60
4.....		1.67	1.75	2.30	2.05	1.55	1.68
5.....		1.55	1.83	2.37	1.98	1.57	1.80
6.....		1.63	1.90	2.21	1.99	1.56	1.68
7.....		1.59	1.99	2.25	1.98	1.66
8.....		1.66	2.15	2.2	1.97	1.68
9.....		1.73	2.3	2.5	1.90	1.76
10.....		1.78	2.4	2.55	1.82	1.48	1.66
11.....		1.75	2.25	2.35	1.77	1.49	1.66
12.....		1.73	2.24	2.35	1.76	1.47	1.64
13.....		1.64	2.18	2.45	1.75	1.46
14.....		1.66	2.20	2.40	1.76	1.45
15.....		1.68	2.36	2.27	1.72	1.41
16.....		1.66	2.30	2.28	1.66	1.39
17.....		1.66	2.47	2.22	1.65	1.45
18.....		1.68	2.46	2.17	1.63	1.57
19.....		1.68	2.45	2.11	1.62	1.62
20.....		1.66	2.55	2.00	1.66	1.63	1.68
21.....		1.63	3.45	2.00	1.64	1.56	1.60
22.....		1.67	3.03	1.96	1.60	1.54	1.62
23.....		1.72	2.65	1.88	1.71	1.45	1.63
24.....		1.74	2.65	1.81	1.63	1.44	1.62
25.....		1.81	2.53	1.80	1.61	1.35	1.61
26.....	1.44	1.74	2.85	1.76	1.61	1.29	1.61
27.....	1.54	1.72	2.57	1.73	1.59	1.27	1.60
28.....	2.70	1.74	2.45	1.76	1.55	1.28	1.58
29.....	1.58	1.79	2.51	1.77	1.49	1.28	1.60
30.....	1.39	1.84	2.85	1.76	1.47	1.27	1.58
31.....	1.34	2.4	1.51	1.36

Daily discharge, in second-feet, of Prickly Pear Creek near Clancy, Mont., for 1912.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
1.....		43	65	134	91	45	47
2.....		51	68	153	90	46	49
3.....		75	74	153	85	53	47
4.....		53	60	124	91	44	53
5.....		44	67	134	83	45	64
6.....		49	74	111	84	44	53
7.....		46	84	117	83	43	52
8.....		52	104	110	82	42	53
9.....		58	124	153	74	40	60
10.....		62	138	162	66	39	52
11.....		60	117	131	61	39	52
12.....		58	116	131	60	38	50
13.....		50	107	146	60	37
14.....		52	110	138	60	36
15.....		53	132	120	57	34
16.....		52	124	121	52	32
17.....		52	148	113	51	36
18.....		53	150	106	49	45
19.....		53	146	98	49	49
20.....		52	162	85	52	49	53

Daily discharge, in second-feet, of Prickly Pear Creek near Clancy, Mont., for 1912—Continued.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
21.....		49	358	85	50	44	47
22.....		53	255	81	47	43	49
23.....		57	179	72	56	36	49
24.....		59	179	65	49	36	49
25.....		65	158	64	48	30	48
26.....	36	59	217	60	48	26	48
27.....	43	57	165	58	46	26	47
28.....	188	59	146	60	44	26	46
29.....	46	63	155	61	39	26	47
30.....	32	68	217	60	38	26	46
31.....	29	138	41	31

NOTE.—Daily discharge determined from a rating curve well defined below a gage height of 2.7 feet and poorly defined above 3 feet.

Discharge estimated as follows: Mar. 1-25 and Sept. 1-19, 30 second-feet; Oct. 13-31, 60 second-feet. Discharge interpolated Aug. 7-9.

Monthly discharge of Prickly Pear Creek near Clancy, Mont., for 1912.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accu- racy.
	Maximum.	Minimum.	Mean.		
January.....			a 25.0	1,540	D.
February.....			a 27.0	1,550	D.
March.....	188		36.3	2,230	D.
April.....	75	43	55.2	3,230	A.
May.....	358	60	140	6,610	A.
June.....	162	58	107	6,370	A.
July.....	91	38	60.8	3,740	A.
August.....	53	26	38.3	2,360	A.
September.....	53		36.6	2,180	C.
October.....			57.2	3,520	C.
The period.....				35,400	

a Estimated.

PRICKLY PEAR CREEK AT EAST HELENA, MONT.

Location.—In NE. $\frac{1}{4}$ sec. 36, T. 10 N., R. 3 E., at the point where the Northern Pacific Railway crosses the stream at East Helena, Mont. The only important tributaries entering Prickly Pear Creek above the station are McClellan and Lump Gulch creeks; Tenmile and Silver creeks come in below.

Records available.—July 18, 1908, to December 31, 1912.

Drainage Area.—Not measured.

Gage.—Staff fastened to piling on the Northern Pacific Railway bridge; datum unchanged.

Channel.—Rocky, clean, and nonshifting.

Discharge measurements.—Made from a highway bridge near the railway bridge or by wading just below the gage.

Diversions.—All the normal flow of Prickly Pear Creek is used for irrigation, the greater part of the water being diverted below the station.

Accuracy.—The bed of the stream is so extremely rough that discharge measurements are difficult, even in low water. Fair results have, however, been obtained.

Discharge measurements of Prickly Pear Creek at East Helena, Mont., in 1912.

Date.	Hydrographer.	Gage height.	Dis-charge.	Date.	Hydrographer.	Gage height.	Dis-charge.
Jan. 12	B. E. Jones	Feet. (a)	Sec.-ft.	May 14	R. R. Randell	Feet.	Sec.-ft.
Mar. 23	do	27	28	15	do	21.47	b133
May 14	do	1.47	123	20	do	1.57	b168
						1.14	54

^a Ice present.^b Probably high.*Daily gage height, in feet, of Prickly Pear Creek at East Helena, Mont., for 1912.*

[R. T. Ray, observer.]

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1.....		0.95	1.05	1.65	1.4	1.1	0.85	1.1	1.2
2.....		1.1	1.05	1.7	1.35	1.15	.85	1.05	1.3
3.....		1.05	1.05	1.65	1.35	1.2	.9	1.05	1.2
4.....		.95	1.0	1.65	1.35	1.25	1.25	1.1	1.15
5.....		.95	1.0	1.6	1.35	1.15	1.1	1.05	1.15
6.....		.95	1.15	1.6	1.3	1.05	1.0	1.12	1.15
7.....		.95	1.18	1.55	1.3	1.05	1.0	1.15	1.15
8.....		1.0	1.2	1.8	1.3	1.05	1.0	1.15	1.15
9.....		1.0	1.4	1.75	1.25	1.15	.95	1.25	1.15
10.....		1.0	1.4	1.75	1.2	1.1	.95	1.2
11.....		1.05	1.45	1.6	1.2	1.05	.95	1.15
12.....		1.1	1.3	1.6	1.2	1.05	.95	1.18
13.....		1.05	1.25	1.65	1.1	1.05	.95	1.18
14.....		.95	1.25	1.6	1.1	1.0	1.0	1.18
15.....		.95	1.55	1.55	1.5	1.0	.95	1.18
16.....		1.0	1.6	1.55	1.2	1.0	.95	1.2
17.....		.95	1.65	1.5	1.15	1.0	1.0	1.22
18.....		1.0	1.65	1.5	1.1	1.0	1.0	1.22
19.....		1.0	1.7	1.4	1.1	1.05	1.05	1.2
20.....		1.0	1.75	1.35	1.1	1.0	1.15	1.18
21.....		1.0	2.1	1.3	1.1	1.0	1.1	1.15
22.....		1.0	2.1	1.3	1.0	1.0	1.1	1.15
23.....		0.95	.95	1.85	1.3	1.15	.95	1.1	1.15
24.....		1.0	1.75	1.25	1.1	.9	1.1	1.15
25.....		1.15	1.1	1.65	1.25	1.1	.85	1.1	1.15
26.....		1.25	1.05	1.65	1.25	1.15	.75	1.1	1.15
27.....		1.5	1.0	1.65	1.25	1.1	.9	1.05	1.15
28.....		1.4	1.0	1.7	1.25	1.1	.9	1.0	1.15
29.....		1.05	1.1	1.7	1.25	1.1	.85	1.02	1.18
30.....		.9	1.05	1.8	1.25	1.1	.85	1.15	1.18
31.....		.85	1.7	1.05	.85	1.18

Daily discharge, in second-feet, of Prickly Pear Creek at East Helena, Mont., for 1912.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1.....		32	44	184	112	51	22	51	68
2.....		51	44	199	100	60	22	44	88
3.....		44	44	184	100	68	26	44	68
4.....		32	37	184	100	78	78	51	60
5.....		32	37	168	100	60	51	44	60
6.....		32	60	168	88	44	37	54	60
7.....		32	65	154	88	44	37	60	60
8.....		37	68	230	88	44	37	60	60
9.....		37	112	214	78	60	32	78	60
10.....		37	112	214	68	51	32	68
11.....		44	126	168	68	44	32	60
12.....		51	88	168	68	44	32	65
13.....		44	78	184	51	44	32	65
14.....		32	78	168	51	37	37	65
15.....		32	154	154	140	37	32	65

Daily discharge, in second-feet, of Prickly Pear Creek at East Helena, Mont., for 1912—Continued.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
16.....		37	168	154	68	37	32	68
17.....		32	184	140	60	37	37	72
18.....		37	184	140	51	37	37	72
19.....		37	199	112	51	44	44	68
20.....		37	214	100	51	37	60	65
21.....		37	326	88	51	37	51	60
22.....		37	326	88	37	37	51	60
23.....		32	246	88	60	32	51	60
24.....		37	214	78	51	26	51	60
25.....	60	51	184	78	51	22	51	60
26.....	78	44	184	78	60	15	51	60
27.....	140	37	184	78	51	26	44	60
28.....	112	37	199	78	51	26	37	60
29.....	44	51	199	78	51	22	40	65
30.....	26	44	230	78	51	22	60	65
31.....	22	199	44	22	65

NOTE.—Daily discharge obtained from a rating curve well defined below 90 second-feet and fairly well defined at higher stages. Mar. 1-24, discharge estimated at 28 second-feet.

Monthly discharge of Prickly Pear Creek at East Helena, Mont., for 1912.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accu- racy.
	Maximum.	Minimum.	Mean.		
January.....	a 27.0	1,660	D.
February.....	a 28.0	1,610	D.
March.....	140	37.2	2,290	D.
April.....	51	32	38.5	2,290	A.
May.....	326	37	148	9,100	B.
June.....	230	78	140	8,330	B.
July.....	140	44	69.0	4,240	A.
August.....	78	15	40.2	2,470	A.
September.....	78	22	41.2	2,450	A.
October.....	78	44	61.1	3,760	A.
November 1-9.....	88	60	65.0	1,160	A.
The period.....	39,400

a Estimated.

LUMP GULCH CREEK NEAR CLANCY, MONT.

Location.—In sec. 4, T. 8 N., R. 3 W., at the ranch of Charles Zastrow, 1 mile from Clancy, 15 miles from Helena, and half a mile above the junction of the creek with Prickly Pear Creek.

Records available.—July 15, 1908, to December 31, 1912.

Drainage area.—Not measured.

Gage.—Staff; on left bank directly south of observer's house. A new gage was set October 12, 1910, at the original site but at a datum 1.0 foot lower than that previously used. All gage heights for 1910 were reduced to new datum.

Channel.—Sandy, likely to be blocked by drift, and shifting.

Discharge measurements.—Made by wading.

Winter flow.—Affected by ice.

Diversions.—The water in Lump Gulch Creek has been extensively used for placer mining. At present the creek furnishes some water for irrigation, but the valley is narrow and affords but little irrigable land. The normal flow of the stream is appropriated.

Accuracy.—Results fair

Discharge measurements of Lump Gulch Creek near Clancy, Mont., in 1912.

Date.	Hydrographer.	Gage height.	Discharge.
		<i>Feet.</i>	<i>Sec.-ft.</i>
Feb. 22	B. E. Jones.....	^a 1.09	3.5
May 16do.....	1.68	36.0
July 7	W. A. Lamb.....	1.30	12.8
Sept. 19	R. R. Randell.....	1.20	7.0

^a Some ice present.*Daily gage height, in feet, of Lump Gulch Creek near Clancy, Mont., for 1912.*

[Chas. Zastrow, observer.]

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1.....		1.4	1.4	1.5	1.2	1.0	1.2	1.1	1.25
2.....		1.4	1.4	1.5	1.2	1.0	1.7	1.1	1.25
3.....		1.4	1.4	1.5	1.3	1.0	1.6	1.1	1.25
4.....		1.4	1.4	1.4	1.3	1.0	1.4	1.25	1.25
5.....		1.4	1.5	1.4	1.3	1.0	1.2	1.25	1.25
6.....		1.4	1.5	1.4	1.3	1.2	1.2	1.25	1.25
7.....		1.5	1.5	1.3	1.3	1.2	1.2	1.3	1.25
8.....		1.4	1.5	1.4	1.3	1.2	1.2	1.3	1.25
9.....		1.4	1.5	1.5	1.3	1.0	1.2	1.3	1.25
10.....		1.4	1.6	1.5	1.3	1.0	1.2	1.3
11.....		1.4	1.5	1.5	1.3	1.0	1.2	1.3
12.....		1.4	1.5	1.5	1.3	1.0	1.2	1.3
13.....		1.4	1.6	1.5	1.3	1.2	1.2	1.25
14.....		1.4	1.6	1.5	1.3	1.2	1.2	1.25
15.....		1.4	1.7	1.5	1.2	1.2	1.2	1.25
16.....		1.4	1.7	1.4	1.2	1.2	1.2	1.25
17.....		1.5	1.7	1.4	1.2	1.2	1.2	1.25
18.....		1.4	1.7	1.3	1.2	1.2	1.25	1.25
19.....		1.4	1.8	1.3	1.2	1.2	1.25	1.25
20.....		1.4	1.9	1.3	1.2	1.2	1.25	1.25
21.....		1.4	2.5	1.3	1.2	1.2	1.15	1.25
22.....		1.4	2.4	1.2	1.2	1.2	1.15	1.25
23.....		1.4	2.3	1.2	1.2	1.2	1.15	1.25
24.....	1.5	1.4	2.2	1.2	1.1	1.2	1.15	1.25
25.....	1.5	1.5	2.1	1.2	1.1	1.2	1.15	1.25
26.....	1.6	1.6	2.0	1.2	1.1	1.2	1.15	1.25
27.....	1.6	1.4	1.9	1.2	1.1	1.2	1.15	1.25
28.....	1.7	1.4	1.8	1.2	1.0	1.2	1.15	1.25
29.....	1.5	1.4	1.7	1.2	1.0	1.2	1.15	1.25
30.....	1.5	1.5	1.7	1.2	1.0	1.2	1.15	1.25
31.....	1.2	1.6	1.0	1.2	1.25

Daily discharge, in second-feet, of Lump Gulch Creek near Clancy, Mont., for 1912.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1.....		18	18	24	7.5	1.5	7.5	3.8	9.8
2.....		18	18	24	7.5	1.5	35	3.8	9.8
3.....		18	18	24	12	1.5	31	3.8	9.8
4.....		18	18	18	12	1.5	18	9.8	9.8
5.....		18	24	18	12	1.5	7.5	9.8	9.8
6.....		18	24	18	12	7.5	7.5	9.8	9.8
7.....		24	24	12	12	7.5	7.5	12	9.8
8.....		18	24	18	12	7.5	7.5	12	9.8
9.....		18	24	24	12	1.5	7.5	12	9.8
10.....		18	31	24	12	1.5	7.5	12
11.....		18	24	24	12	1.5	7.5	12
12.....		18	24	24	12	1.5	7.5	12
13.....		18	31	24	12	7.5	7.5	9.8
14.....		18	31	24	12	7.5	7.5	9.8
15.....		18	38	24	7.5	7.5	7.5	9.8

Daily discharge, in second feet, of Lump Gulch Creek near Clancy, Mont., for 1912—
Continued.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
16.....		18	38	18	7.5	7.5	7.5	9.8
17.....		24	38	18	7.5	7.5	7.5	9.8
18.....		18	38	12	7.5	7.5	9.8	9.8
19.....		18	45	12	7.5	7.5	9.8	9.8
20.....		18	52	12	7.5	7.5	9.8	9.8
21.....		18	94	12	7.5	7.5	5.6	9.8
22.....		18	87	7.5	7.5	7.5	5.6	9.8
23.....		18	80	7.5	7.5	7.5	5.6	9.8
24.....	24	18	73	7.5	3.8	7.5	5.6	9.8
25.....	24	24	66	7.5	3.8	7.5	5.6	9.8
26.....	31	31	59	7.5	3.8	7.5	5.6	9.8
27.....	31	18	52	7.5	3.8	7.5	5.6	9.8
28.....	38	18	45	7.5	1.5	7.5	5.6	9.8
29.....	24	18	38	7.5	1.5	7.5	5.6	9.8
30.....	24	24	38	7.5	1.5	7.5	5.6	9.8
31.....	7.5	31	1.5	7.5	9.8

NOTE.—Daily discharge determined from a rating curve fairly well defined below gage height 1.7 feet and poorly defined at higher stages. Mar. 1-23, discharge estimated at 5 second-feet.

Monthly discharge of Lump Gulch Creek near Clancy, Mont., for 1912.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accu- racy.
	Maximum.	Minimum.	Mean.		
January.....			a 3.5	215	D.
February.....			a 3.5	201	D.
March.....	38		10.3	633	D.
April.....	31	18	19.2	1,140	B.
May.....	94	18	40.2	2,470	B.
June.....	24	7.5	15.8	940	B.
July.....	12	1.5	7.99	491	B.
August.....	7.5	1.5	5.76	354	B.
September.....	38	5.6	9.25	550	B.
October.....	12	3.8	9.65	593	B.
November 1-9.....	9.8	9.8	9.8	175	B.
The period.....				7,760	

a Estimated.

TENMILE CREEK NEAR HELENA, MONT.

Location.—In SW. $\frac{1}{4}$ SE. $\frac{1}{4}$ sec. 22 T. 10 N., R. 4 W., opposite the Broadwater Hotel near Helena, Mont.

Records available.—July 8, 1908, to December 31, 1912.

Drainage area.—Not measured.

Gage.—Staff on right bank; datum unchanged.

Channel.—Shifts somewhat during flood stages.

Discharge measurements.—Made by wading.

Winter flow.—Affected by ice.

Diversions.—Part of the water supply for the city of Helena is taken from Tenmile Creek above the station. Two irrigation ditches also take water from the creek above the gage. The entire low-water flow is appropriated and used before it reaches the mouth of the creek.

Accuracy.—At low and medium stages conditions favor accurate determination of discharge.

Discharge measurements of Tenmile Creek near Helena, Montana, in 1912.

Date.	Hydrographer.	Gage height.	Dis-charge.	Date.	Hydrographer.	Gage height.	Dis-charge.
Jan. 12	B. E. Jones	<i>Feet.</i> a 1.65	<i>Sec.-ft.</i> 3.3	May 14	R. R. Randell	<i>Feet.</i> b 3.40	<i>Sec.-ft.</i> 137
Mar. 22	do.	a 1.63	2.8	Sept. 18	do.	1.81	8.3
May 14	do.	b 3.40	142				

^a Ice present.^b Impossible to read gage closer than half tenths on account of wave action.*Daily gage height, in feet, of Tenmile Creek near Helena, Mont., for 1912.*

[J. W. Jackson, observer.]

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1.		1.95	2.65	3.6	2.3	1.6	1.6	1.9	2.15
2.		2.05	2.75	3.6	2.65	1.6	1.6	1.9	2.15
3.		2.1	2.7	3.5	2.75	1.7	1.75	1.9	2.15
4.		2.2	2.75	3.4	2.7	1.65	1.95	2.0	2.15
5.		2.15	2.8	3.25	2.6	1.6	2.0	2.1	2.15
6.		2.15	2.9	3.2	2.5	1.6	1.95	2.1	2.2
7.		2.1	2.95	3.15	2.45	1.55	1.9	2.05	2.2
8.		2.25	3.2	3.15	2.4	1.55	1.75	2.05	2.2
9.		2.3	3.3	3.25	2.4	1.55	1.75	2.1	2.2
10.		2.45	3.7	3.3	2.3	1.55	1.7	2.05	
11.		2.45	3.8	3.25	2.15	1.6	1.7	2.0	
12.		2.55	3.6	3.2	2.05	1.6	1.7	2.0	
13.		2.5	3.5	3.1	1.95	1.55	1.85	2.1	
14.		2.3	3.4	2.9	2.0	1.55	1.85	2.15	
15.		2.3	3.5	2.85	2.0	1.5	1.8	2.2	
16.		2.3	3.75	2.8	1.95	1.5	1.8	2.2	
17.		2.4	3.8	2.75	1.95	1.5	1.85	2.25	
18.		2.45	3.6	2.65	2.05	1.55	1.85	2.3	
19.		2.45	3.65	2.5	2.0	1.95	1.85	2.3	
20.		2.45	3.8	2.4	1.95	1.95	1.9	2.3	
21.		2.4	4.2	2.3	1.95	1.9	1.95	2.25	
22.		2.45	4.4	2.25	1.95	1.8	1.9	2.2	
23.		2.5	4.2	2.25	1.95	1.65	1.9	2.2	
24.		2.55	4.0	2.2	1.9	1.6	1.9	2.15	
25.		1.8	2.55	3.9	2.2	1.9	1.9	2.15	
26.		1.9	2.55	4.0	2.15	1.85	1.6	1.9	2.15
27.		3.4	2.5	3.9	2.05	1.85	1.6	1.9	2.15
28.		2.2	2.55	3.8	2.0	1.85	1.6	1.9	2.15
29.		2.1	2.65	3.8	2.1	1.75	1.6	1.9	2.15
30.		1.9	2.65	3.8	2.1	1.65	1.6	1.9	2.15
31.		1.9		3.65		1.55	1.6		2.15

Daily discharge, in second-feet, of Tenmile Creek near Helena, Mont., for 1912.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1.		12	58	168	30	3.0	3.0	10	21
2.		16	67	168	58	3.0	3.0	10	21
3.		18	62	155	67	5.0	6.2	10	21
4.		24	67	142	62	4.0	12	14	21
5.		21	72	124	53	3.0	14	18	21
6.		21	82	118	45	3.0	12	18	24
7.		18	88	112	41	2.3	10	16	24
8.		27	118	112	37	2.3	6.2	16	24
9.		30	130	124	37	2.3	6.2	18	24
10.		41	181	130	30	2.3	5.0	16	
11.		41	194	124	21	3.0	5.0	14	
12.		49	168	118	16	3.0	5.0	14	
13.		45	155	106	12	2.3	8.7	18	
14.		30	142	82	14	2.3	8.7	21	
15.		30	155	77	14	1.6	7.4	24	

Daily discharge, in second-feet, of Tenmile Creek near Helena, Mont., for 1912—Contd.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
16.		30	188	72	12	1.6	7.4	24
17.		37	194	67	12	1.6	8.7	27
18.		41	168	58	16	2.3	8.7	30
19.		41	174	45	14	12	8.7	30
20.		41	194	37	12	12	10	30
21.		37	250	30	12	10	12	27
22.		41	278	27	12	7.4	10	24
23.		45	250	27	12	4.0	10	24
24.		49	222	24	10	3.0	10	21
25.	7.4	49	208	24	10	3.0	10	21
26.	10	49	222	21	8.7	3.0	10	21
27.	142	45	208	16	8.7	3.0	10	21
28.	24	49	194	14	8.7	3.0	10	21
29.	18	58	194	18	6.2	3.0	10	21
30.	10	58	194	18	4.0	3.0	10	21
31.	10		174		2.3	3.0		21

NOTE.—Daily discharge determined from a rating curve fairly well defined below a gage height of 3.5 feet, and poorly defined at higher stages. Discharge Mar. 1-24 estimated at 3 second-feet.

Monthly discharge of Tenmile Creek near Helena, Mont., for 1912.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accu- racy.
	Maximum.	Minimum.	Mean.		
January.			α 3.0	184	D.
February.			α 3.0	173	D.
March.	142		9.5	584	C.
April.	58	12	36.4	2,170	B.
May.	278	58	163	10,000	C.
June.	168	14	78.6	4,680	B.
July.	67	2.3	22.5	1,380	B.
August.	12	1.6	3.78	232	B.
September.	14	3.0	8.60	512	B.
October.	30	10	20.0	1,230	B.
November 1-9.	24	21	22.3	398	B.
The period.				21,500	

α Estimated.

SEVENMILE CREEK AT BIRDSEYE, MONT.

Location.—In the SW. $\frac{1}{4}$ sec. 31, T. 11 N., R 4 W., at Richard Tobin's ranch, one-fourth mile from Birdseye, Mont.

Records available.—March 27, 1909, to December 31, 1912. From July 16, 1908, to August 26, 1908, a station was maintained on this stream at Dr. Head's ranch, near Helena.

Drainage area.—Not measured.

Gage.—Staff.

Channel.—Sandy and shifting.

Discharge measurements.—Made by wading.

Winter flow.—Affected by ice.

Diversions.—Entire flow of creek is appropriated and used for irrigation. There is also some placer mining on the creek above the station.

Accuracy.—Owing to shifting bed and lack of measurements results can be considered only fair.

Discharge measurements of Sevenmile Creek at Birdseye, Mont., in 1912.

Date.	Hydrographer.	Gage height.	Dis-charge.
Mar. 23	B. E. Jones.....	<i>Fect.</i>	<i>Sec.-ft.</i>
May 17do.....	(a)	
Sept. 18	R. R. Randall.....	3.01	5.3
		1.84	24.
			5.0

a Frozen solid at gage.

Daily gage height, in feet, of Sevenmile Creek at Birdseye, Mont., for 1912.

[R. Tobin, observer.]

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1.....		2.8	2.45	3.15	2.05	1.9	1.65	1.7	1.75
2.....		2.9	2.5	2.95	2.1	1.85	1.65	1.75	1.75
3.....		2.55	2.6	2.8	2.05	1.85	1.65	1.75	1.75
4.....		2.65	2.6	2.7	2.15	1.85	1.7	1.7	1.8
5.....		2.55	2.6	2.55	2.2	1.85	1.7	1.7	1.75
6.....		2.45	2.65	2.45	2.1	1.9	1.65	1.65	1.75
7.....		2.35	2.7	2.5	2.0	1.8	1.65	1.75	1.75
8.....		2.35	2.85	2.4	2.05	1.75	1.7	1.75	1.7
9.....		2.35	2.9	2.5	2.05	1.75	1.65	1.75	1.65
10.....		2.5	3.1	2.45	2.05	1.75	1.7	1.8
11.....		2.45	3.05	2.4	2.1	1.8	1.65	1.75
12.....		2.45	3.05	2.4	2.0	1.85	1.65	1.75
13.....		2.45	3.1	2.3	1.95	1.75	1.65	1.75
14.....		2.45	3.1	2.25	1.95	1.75	1.65	1.7
15.....		2.4	3.0	2.25	1.95	1.8	1.7	1.7
16.....		2.35	3.05	2.25	1.85	1.9	1.75	1.75
17.....		2.4	3.05	2.3	1.9	1.85	1.75	1.65
18.....		2.45	3.05	2.3	1.85	1.95	1.7	1.75
19.....		2.45	3.1	2.15	1.85	1.75	1.7	1.75
20.....		2.5	3.3	2.05	1.85	1.75	1.8	1.7
21.....		2.45	3.95	2.05	1.85	1.8	1.7	1.65
22.....		2.45	4.4	2.0	1.9	1.75	1.7	1.65
23.....		2.45	3.9	2.0	1.85	1.75	1.75	1.65
24.....		2.5	3.9	1.9	1.9	1.75	1.75	1.75
25.....		2.5	3.7	1.85	1.9	1.75	1.8	1.7
26.....		2.45	3.55	1.85	1.75	1.7	1.75	1.7
27.....		2.45	3.5	1.9	1.8	1.65	1.75	1.65
28.....		2.4	3.4	2.0	1.75	1.65	1.75	1.65
29.....	2.55	2.4	3.3	1.95	1.75	1.65	1.75	1.65
30.....	2.45	2.6	3.2	2.0	1.85	1.65	1.7	1.8
31.....	2.55	3.2	1.9	1.7	1.75

Daily discharge, in second-feet, of Sevenmile Creek at Birdseye, Mont., for 1912.

Day.	July.	Aug.	Sept.	Oct.	Nov.	Day.	July.	Aug.	Sept.	Oct.	Nov.
1.....	9	6	1.9	2.6	3.3	16.....	5	6	3.3	3.3
2.....	10	5	1.9	3.3	3.3	17.....	6	5	3.3	1.9
3.....	9	5	1.9	3.3	3.3	18.....	5	7	2.6	3.3
4.....	12	5	2.6	2.6	4	19.....	5	3.3	2.6	3.3
5.....	13	5	2.6	2.6	3.3	20.....	5	3.3	4	2.6
6.....	10	6	1.9	1.9	3.3	21.....	5	4	2.6	1.9
7.....	8	4	1.9	3.3	3.3	22.....	6	3.3	2.6	1.9
8.....	9	3.3	2.6	3.3	2.6	23.....	5	3.3	3.3	1.9
9.....	9	3.3	1.9	3.3	1.9	24.....	6	3.3	3.3	3.3
10.....	9	3.3	2.6	4	25.....	6	3.3	4	2.6
11.....	10	4	1.9	3.3	26.....	3.3	2.6	3.3	2.6
12.....	8	5	1.9	3.3	27.....	4	1.9	3.3	1.9
13.....	7	3.3	1.9	3.3	28.....	3.3	1.9	3.3	1.9
14.....	7	3.3	1.9	2.6	29.....	3.3	1.9	3.3	1.9
15.....	7	4	2.6	2.6	30.....	5	1.9	2.6	4
						31.....	6	2.6	3.3

NOTE.—There was a considerable shift in the channel some time in the spring but not enough measurements were made to properly define it. For this reason no estimates have been made for the period previous to July 1. Daily discharge after July 1, was determined from a fairly well-defined rating curve, based on one measurement in 1912 and two in 1913.

Monthly discharge of Sevenmile Creek at Birdseye, Mont., for 1912.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accu- racy.
	Maximum.	Minimum.	Mean.		
July.....	13	3.3	6.96	428	B.
August.....	7	1.9	3.87	238	B.
September.....	4	1.9	2.65	158	B.
October.....	4	1.9	2.80	172	B.
November 1-9.....	4	1.9	3.14	56	B.
The period.....				1,050	

SUN RIVER BASIN.**ADJUDICATED WATER RIGHTS.**

Practically the entire unappropriated flow of Sun River and its tributaries has been filed on by the United States Reclamation Service for the irrigation of 276,000 acres of land on the Sun River project. Most of this water will be obtained from the storage of flood waters.

The following are adjudicated water rights on Sun River and tributaries prior to the filings of the United States Reclamation Service:

Summary of appropriations, by creeks.

	Second-feet.
A. Sun River.....	582.530
Dry Creek.....	30.450
Rock Camp Creek.....	3.375
Simms Creek.....	23.600
B. North Fork of Sun River.....	203.395
Richardson Creek.....	1.250
Francis Creek.....	1.875
Buttolph Creek.....	1.000
South Fork of Sun River.....	120.860
Du Bray Creek.....	49.200
Elk Creek.....	18.740
Hay Coulee.....	1.000
Frank Goss Creek.....	8.340
West Creek.....	.625
Smith Creek.....	64.250
Ford Creek.....	46.400
Smith Lake.....	6.250
Duval Creek.....	1.875
C. Willow Creek.....	38.300
Breed Creek.....	1.000
Little Willow Creek.....	21.520
Spring Coulee.....	2.000
Cutrock Creek.....	.660
Barr Creek.....	6.500
Furman Creek.....	3.000
Springs, lakes, and coulees tributary to Little Willow Creek.....	7.580
	<hr/> 1,245.575

Rights belonging to or subsequent to United States Reclamation Service.....	Second-foot. 44. 510
Rights prior to United States Reclamation Service appropriations.....	1, 201. 065
A. Rights belonging to United States Reclamation Service or subsequent to United States Reclamation Service Sun River appropriations.....	30. 41
B. Rights subsequent to United States Reclamation Service North Fork of Sun River appropriations.....	12. 00
C. Rights belonging to United States Reclamation Service on Willow Creek.....	2. 10

NORTH FORK OF NORTH FORK OF SUN RIVER NEAR AUGUSTA, MONT.

Location.—In sec. 22, T. 22 N., R. 10 W., at Warm Springs, about 28 miles northwest of Augusta.

Records available.—May 27, 1911, to September 30, 1912.

Drainage area.—Not measured.

Gage.—The gage consists of two staffs. The low-water gage is nailed to a post driven into the bed of the stream on the left bank. The high-water gage is nailed to a post on top of the bank. The low-water gage reads to 93.00 feet.

Channel.—Practically permanent.

Discharge measurements.—At high stages measurements are made from a cable and at low stages by wading near the gage.

• **Winter flow.**—Affected by ice.

Diversions.—There are no diversions or artificial control above this station.

Accuracy.—Conditions for obtaining accurate discharge data are excellent, but results for 1911 are rather uncertain owing to lack of discharge measurements.

*Discharge measurements of North Fork of North Fork of Sun River near Augusta, Mont.,
in 1911 and 1912.*

Date.	Hydrographer.	Gage height.	Dis-charge.	Date.	Hydrographer.	Gage height.	Dis-charge.
1911. Oct. 23	W. A. Lamb.....	<i>Fect.</i> 89.1	<i>Sec.-feet.</i> 127	1912. May 28	B. E. Jones.....	<i>Fect.</i> 91.79	<i>Sec.-feet.</i> 1,460
				July 9do.....	89.68	391
				Aug. 20do.....	89.14	153
1912. Mar. 31	B. E. Jones.....	88.79	85				

^a Ice present.

Daily gage height, in feet, of North Fork of North Fork of Sun River near Augusta, Mont., for 1911 and 1912.

[illegible]

Daily gage height, in feet, of North Fork of North Fork of Sun River near Augusta, Mont., for 1911 and 1912—Continued.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Day.	Apr.	May.	June.	July.	Aug.	Sept.
1912.							1912.						
1.....		89.6	91.6	90.25	89.2	89.05	16.....	89.2	92.0	91.1	89.45	89.1	89.1
2.....		89.55	91.2	90.25	89.2		17.....	89.35	92.2	90.9	89.4		
3.....		89.5	91.3	90.1	89.15		18.....	89.25	92.0	90.9	89.35		
4.....		89.45	91.6		89.15	89.15	19.....	89.35	92.1	91.0	89.35		
5.....		89.4	91.3		89.15		20.....	89.25	92.6	91.1	89.35	89.14	89.1
6.....		89.6	91.3		89.15	89.1	21.....	89.3	92.5	91.3	89.35		
7.....		89.75	91.3	89.85	89.15		22.....	89.35	92.2		89.35		
8.....		90.2	91.7	89.75	89.1		23.....	89.35	91.5		89.3		
9.....		90.8	92.2	89.68	89.1		24.....	89.45	91.4	90.9	89.35		
10.....		91.3	91.9		89.1	89.1	25.....	89.45	91.6	90.8	89.3		89.05
11.....		91.1	91.9	89.6	89.1		26.....	89.4	92.0	90.6	89.3		
12.....		90.9	91.8	89.55	89.1		27.....	89.45		90.35	89.25	89.05	
13.....		90.9	92.0	89.5	89.1	89.1	28.....	89.45	91.9	90.25	89.25		
14.....	89.25	91.2	91.8	89.5	89.1		29.....	89.55	91.6		89.2		
15.....	89.35	91.7	91.3	89.45	89.1		30.....	89.6	91.8		89.2		89.05
							31.....		91.4		89.2		

Daily discharge, in second-feet, of North Fork of North Fork of Sun River, near Augusta, Mont., for 1911 and 1912.

Day.	May.	June.	July.	Aug.	Sept.	Oct.	Day.	May.	June.	July.	Aug.	Sept.	Oct.
1911.							1911.						
1.....		1,250	1,050	210	140		16.....		1,520	350	170	140	
2.....		1,800	950	210	140		17.....		1,470	350	170	140	
3.....		1,960	900	210	140		18.....		1,420	350	170	140	
4.....		1,890	850	255	170		19.....		1,300	300	140	140	
5.....		1,520	800	210	170		20.....		1,250	300	140	140	
6.....		1,360	750	210	170	400	21.....		1,300	300	140	140	
7.....		1,580	700	210	170		22.....		1,420	300	140	140	
8.....		1,690	650	210	140		23.....		1,360	300	140	140	
9.....		1,520	600	210	140		24.....		1,420	255	140	140	
10.....		1,580	550	210	140		25.....		1,300	255	140	140	
11.....		1,520	500	170	140		26.....		1,200	210	140	150	
12.....		1,800	450	170	140		27.....	750	1,100	210	140	150	
13.....		1,860	450	170	140		28.....	700	1,150	210	140	150	
14.....		1,910	400	170	140		29.....	700	1,050	210	140	150	
15.....		1,690	400	170	140		30.....	700	1,050	210	140	150	
							31.....	900		210	140		

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Day.	Apr.	May.	June.	July.	Aug.	Sept.
1912.							1912.						
1.....		350	1,360	675	170	130	16.....	170	1,580	1,100	278	140	140
2.....		325	1,150	675	170	140	17.....	232	1,690	1,000	255	140	140
3.....		300	1,200	600	155	140	18.....	190	1,580	1,000	232	140	140
4.....		278	1,360	570	155	155	19.....	232	1,640	1,050	232	145	140
5.....		255	1,200	540	155	148	20.....	190	1,910	1,100	232	152	140
6.....		350	1,200	505	155	140	21.....	210	1,860	1,200	232	150	140
7.....		425	1,200	475	155	140	22.....	232	1,690	1,130	232	140	140
8.....		650	1,420	425	140	140	23.....	232	1,300	1,070	210	140	140
9.....		950	1,690	390	140	140	24.....	278	1,250	1,000	232	140	130
10.....		1,200	1,520	350	140	140	25.....	278	1,360	950	210	140	130
11.....		1,100	1,520	350	140	140	26.....	255	1,580	850	210	130	130
12.....		1,000	1,470	325	140	140	27.....	278	1,550	725	190	130	130
13.....		1,000	1,580	300	140	140	28.....	278	1,520	675	190	130	130
14.....	190	1,150	1,470	300	140	140	29.....	325	1,360	675	170	130	130
15.....	232	1,420	1,200	278	140	140	30.....	350	1,470	675	170	130	130
							31.....		1,250		170	130	

NOTE.—Daily discharge for 1911 and 1912 determined from a fairly well-defined rating curve. Discharge Apr. 1-13, 1912, estimated at 160 second-feet. Discharge interpolated for days for which gage heights are missing except Sept. 22-30, 1911, where the daily discharge was estimated.

Monthly discharge of North Fork of North Fork of Sun River near Augusta, Mont., for 1911 and 1912.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accu- racy.
	Maximum.	Minimum.	Mean.		
1911.					
May 27-31.....	900	700	750	7,440	B.
June.....	1,960	1,050	1,470	87,500	B.
July.....	1,050	210	462	28,400	B.
August.....	255	140	172	10,600	B.
September.....			146	8,690	C.
The period.....				143,000	
1912.					
April.....	350		208	12,400	C.
May.....	1,910	255	1,140	70,100	B.
June.....	1,690	675	1,160	69,000	B.
July.....	675	170	329	20,200	B.
August.....	170	130	143	8,790	B.
September.....	155	130	138	8,210	C.
The period.....				189,000	

NORTH FORK OF SUN RIVER NEAR AUGUSTA, MONT.

Location.—In sec. 33, T. 22 N., R. 7 W., near the Hennessy Co.'s ranch, 12 miles northwest of Augusta, 21 miles southwest of Chouteau, Mont.

Records available.—October 31, 1903, to December 31, 1912.

Drainage area.—Not measured.

Gage.—Chain; datum unchanged.

Channel.—Permanent.

Discharge measurements.—Made from cable.

Winter flow.—Affected by ice.

Diversions.—Water is diverted below the station for irrigation of the valley lands, but no water is diverted above the station.

Accuracy.—Conditions for accurate determination of discharge are excellent, except during the winter months.

Discharge measurements of North Fork of Sun River near Augusta, Mont., in 1912.

Date.	Hydrographer.	Gage height.	Dis- charge.	Date.	Hydrographer.	Gage height.	Dis- charge.
Mar. 30	B. E. Jones.....	<i>Feet.</i> 0.61	<i>Sec.-ft.</i> 184	July 13	B. E. Jones.....	<i>Feet.</i> 1.72	<i>Sec.-ft.</i> 880
May 26do.....	4.12	4,160	Aug. 17do.....	.94	384
July 12do.....	1.81	944				

^a Ice present.

Daily gage height, in feet, of North Fork of Sun River near Augusta, Mont., for 1912.

[Chas. Dox, observer.]

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1.....		0.55	1.8	3.7	2.6	1.1	0.85	0.8	0.85	0.75
2.....		.6	1.85	3.9	2.4	1.1	.9	.85	.75	.7
3.....		.6	1.75	3.7	2.3	1.15	.85	.8	.8	.75
4.....		.8	1.7	3.7	2.15	1.1	.95	.85	.75	.7
5.....		.95	1.85	3.6	2.1	1.1	.95	.8	.75	.7
6.....		.75	1.7	3.5	2.1	1.05	.95	.8	.8	.75
7.....		.8	1.95	3.9	2.0	1.0	.95	.85	.8	.7
8.....		.9	2.3	4.2	2.0	1.05	.9	.7	.85	.75
9.....		1.1	2.8	4.1	1.95	1.0	.95	.75	.8	.7
10.....		1.45	3.4	4.3	1.8	1.05	.9	.7	.8	.7

Daily gage height, in feet, of North Fork of Sun River near Augusta, Mont., for 1912—
Continued.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
11.....		1.7	3.5	4.0	1.85	1.0	0.9	0.7	0.85	0.75
12.....		1.75	3.0	3.9	1.7	.95	.95	.75	.8	.7
13.....		1.8	2.9	3.8	1.7	.95	.9	.7	.85	.75
14.....		1.4	3.5	3.7	1.7	.9	.95	.75	.8	.7
15.....		1.35	3.7	3.6	1.6	.95	.9	.7	.8	.7
16.....		1.35	4.2	3.3	1.65	.9	.9	.8	.85	.75
17.....		1.45	4.3	3.2	1.5	.9	.95	.9	.8	.7
18.....		1.4	4.3	3.1	1.5	.95	.9	.9	.85	.75
19.....		1.5	4.3	3.1	1.5	1.0	.9	.95	.8	.7
20.....		1.45	4.4	3.2	1.4	1.05	.85	.85	.8	.7
21.....		1.4	4.8	3.3	1.55	1.05	.85	.8	.8	.85
22.....		1.55	4.5	3.2	1.4	.9	.85	.85	.75	.8
23.....		1.55	4.0	3.1	1.4	.9	.8	.8	.8	.95
24.....		1.7	3.8	3.1	1.4	.8	.85	.85	.75	.85
25.....	0.5	1.75	3.5	3.0	1.3	.85	.8	.8	.75	.8
26.....	.55	1.7	4.2	2.8	1.35	.75	.85	.8	.75	.75
27.....	.55	1.75	4.3	2.7	1.25	.8	.85	.85	.7	.7
28.....	.55	1.7	3.9	2.5	1.2	.85	.8	.8	.75	.7
29.....	.5	1.8	3.7	2.45	1.2	.8	.85	.85	.7	.7
30.....	.6	1.85	3.7	2.4	1.15	.85	.8	.8	.7	.7
31.....	.65		3.7		1.15	.8		.8		.75

Daily discharge, in second-feet, of North Fork of Sun River near Augusta, Mont., for 1912.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1.....		222	950	3,340	1,710	440	320	300	320	282
2.....		235	990	3,740	1,500	440	340	320	282	285
3.....		235	910	3,340	1,400	470	320	300	300	282
4.....		300	870	3,340	1,260	440	362	320	282	265
5.....		362	990	3,150	1,210	440	362	300	282	265
6.....		282	870	2,970	1,210	412	362	300	300	282
7.....		300	1,080	3,740	1,120	385	362	320	300	265
8.....		340	1,400	4,370	1,120	412	340	265	320	282
9.....		440	1,950	4,160	1,080	385	362	282	300	265
10.....		670	2,800	4,580	950	412	340	265	300	265
11.....		870	2,970	3,950	990	385	340	265	320	282
12.....		910	2,200	3,740	870	362	362	282	300	265
13.....		950	2,070	3,540	870	362	340	265	320	282
14.....		630	2,970	3,340	870	340	362	282	300	265
15.....		595	3,340	3,150	790	362	340	265	300	265
16.....		595	4,370	2,640	830	340	340	300	320	282
17.....		670	4,580	2,490	710	340	362	340	300	265
18.....		630	4,580	2,340	710	362	340	340	320	282
19.....		710	4,580	2,340	710	385	340	362	300	265
20.....		670	4,790	2,490	630	412	320	320	300	265
21.....		630	5,670	2,640	750	412	320	300	300	265
22.....		750	5,000	2,490	630	340	320	320	282	265
23.....		750	3,950	2,340	630	340	300	300	300	265
24.....		870	3,540	2,340	630	300	320	320	282	265
25.....	210	910	2,970	2,200	560	320	300	300	282	265
26.....	222	870	4,370	1,950	595	282	320	300	282	265
27.....	222	910	4,580	1,830	530	300	320	320	265	265
28.....	222	870	3,740	1,600	500	320	300	300	282	265
29.....	210	950	3,340	1,550	500	300	320	320	265	265
30.....	235	990	3,340	1,500	470	320	300	300	265	265
31.....	250		3,340		470	300		300		282

NOTE.—Daily discharge determined from a rating curve fairly well defined below a discharge of 700 second-feet and well defined above. Ice present at the station Dec. 21-26. Discharge interpolated.

Monthly discharge of North Fork of Sun River near Augusta, Mont., for 1912.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accu- racy.
	Maximum.	Minimum.	Mean.		
March 25-31.....	250	210	224	3,110	B.
April.....	990	222	637	37,900	A.
May.....	5,670	870	3,000	184,000	A.
June.....	4,580	1,500	2,910	173,000	A.
July.....	1,710	470	865	53,200	A.
August.....	470	282	368	22,600	B.
September.....	362	300	345	20,500	B.
October.....	362	265	302	18,600	B.
November.....	320	265	296	17,600	B.
December.....	282	265	270	16,600	B.
The period.....				547,000	

SUN RIVER AT FORT SHAW, MONT.

Location.—In SW. $\frac{1}{4}$ sec. 1, T. 20 N., R. 2 W., at Fort Shaw, Mont.

Records available.—May 16, 1912, to December 31, 1912. Previous to 1912 practically the same data were obtained on Sun River at Sun River.

Drainage area.—Not measured.

Gage.—A standard chain gage fastened to the footbridge near the right bank.

Channel.—Permanent.

Discharge measurements.—At high and medium stages measurements are made from the footbridge at the gage and at low stages by wading.

Winter flow.—Affected by ice.

Diversions.—There are adjudicated rights for diverting 248 second-feet from Sun River direct and 664 second-feet from tributaries above this station. In addition to this the Fort Shaw United States Reclamation Service canal takes out about 200 second-feet during the irrigation season.

Accuracy.—Conditions for obtaining accurate discharge data are excellent, but the results for 1912 are only fair, due to errors in the gage.

Discharge measurements of Sun River at Fort Shaw, Mont., in 1912.

Date.	Hydrographer.	Gage height.	Dis- charge.
July 16	B. E. Jones.....	<i>Feet.</i> 61.33	<i>Sec.-ft.</i> 662
Aug. 28do.....	60.60	289

Daily gage height, in feet, and discharge, in second-feet, of Sun River at Fort Shaw, Mont., for 1912.

[W. C. Hallock, observer.]

Day.	June.		July.		August.		September.		December.	
	Gage height.	Dis-charge.	Gage height.	Dis-charge.	Gage height.	Dis-charge.	Gage height.	Dis-charge.	Gage height.	Dis-charge.
	<i>Feet.</i>	<i>Sec.-ft.</i>	<i>Feet.</i>	<i>Sec.-ft.</i>	<i>Feet.</i>	<i>Sec.-ft.</i>	<i>Feet.</i>	<i>Sec.-ft.</i>	<i>Feet.</i>	<i>Sec.-ft.</i>
1.....			61.95	1,520	60.7	350	60.75	385		
2.....			62.05	1,660	60.8	420	60.7	350		
3.....			61.95	1,520	60.85	458	60.75	385		
4.....			61.95	1,520	61.0	570	60.85	458		
5.....			61.95	1,520	61.0	570	60.95	532		
6.....					61.1	650	61.05	610	61.05	
7.....			61.75	1,280	60.9	495	61.0	570		
8.....			61.75	1,280	61.0	570	61.05	610		
9.....			61.65	1,180	61.0	570	60.95	532		
10.....			61.65	1,180	61.0	570	60.95	532		
11.....	63.4	4,060	61.55	1,070	60.9	495	60.95	532		
12.....	63.1	3,410	61.55	1,070	60.9	495	60.9	495		
13.....	63.2	3,620	61.55	1,070	60.75	385	61.05	610		
14.....	63.2	3,620	61.45	970	60.8	420	61.05	610	60.75	
15.....	62.8	2,840	61.45	970	60.8	420	61.05	610		
16.....	62.7	2,660	61.4	920	60.65	320	61.05	610		
17.....	62.5	2,310	61.35	872	60.8	420	61.0	570		
18.....	62.4	2,150	61.25	780	60.75	385	61.05	610		
19.....	62.5	2,310	61.25	780	61.0	570	60.95	532		
20.....	62.4	2,150	61.25	780	61.15	692	60.95	532		
21.....	62.5	2,310	61.25	780	61.05	610	60.95	532		
22.....	62.6	2,480	61.35	872	60.95	532	60.8	420		
23.....	62.5	2,310	61.25	780	60.9	495	60.85	458	60.3	
24.....	62.5	2,310	61.2	735	60.85	458	60.95	532		
25.....	62.5	2,310	61.1	650	60.75	385	60.95	532		
26.....	62.35	2,080	61.25	780	60.65	320	60.95	532		
27.....	62.1	1,720	61.15	692	60.75	385	60.8	420		
28.....	62.05	1,660	61.2	735	60.6	290	60.85	458		
29.....	61.95	1,520	61.05	610	60.65	320	60.95	532		
30.....	61.85	1,400	61.0	570	60.65	320			60.35	
31.....			60.9	495	60.75	385				

NOTE.—Relation of gage height to discharge affected by ice. Daily discharge was determined from a rating curve fairly well defined.

Monthly discharge of Sun River at Fort Shaw, Mont., for 1912.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accu- racy.
	Maximum.	Minimum.	Mean.		
June 11-30.....	4,060	1,400	2,460	97,600	B.
July.....	1,660	495	1,000	61,500	B.
August.....	692	290	462	28,400	B.
September 1-29.....	610	350	520	29,900	B.

SUN RIVER AT SUN RIVER, MONT.

Location.—In the NW. $\frac{1}{4}$ NE. $\frac{1}{4}$ sec. 34, T. 21 N., R. 1 W., at the highway bridge at Sun River, Mont. The principal tributaries of Sun River all enter above the station; South Fork of Sun River, Willow Creek, and Simms Creek are the most important.

Records available.—July 31, 1905, to December 31, 1912.

Drainage area.—Not measured.

Gage.—A staff nailed to piling on the left bank just above the bridge; datum unchanged.

Channel.—Shifts at all stages.

Discharge measurements.—Made from bridge or by wading.

Diversions.—The Sun River canal, with an adjudicated water right of 63 second-feet, takes out between this station and the one at Fort Shaw. (See station description for Sun River at Fort Shaw.)

Accuracy.—Conditions at the measuring section have been very poor since the high water of 1907; at low stages good measurements can be made.

Discharge measurements of Sun River at Sun River, Mont., in 1912.

Date.	Hydrographer.	Gage height.	Discharge.
		<i>Feet.</i>	<i>Sec.-ft.</i>
June 4	B. E. Jones.....	6.71	3,860
July 19do.....	3.53	755
Aug. 29do.....	2.68	342

Daily gage height, in feet, of Sun River at Sun River, Mont., for 1912.

[R. A. Lange, observer.]

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
1.....		2.85	3.8	7.1	4.8	3.1	2.65	2.9
2.....		2.75	3.85	6.9	4.6	3.25	2.65	2.85
3.....		2.9	4.0	6.8	4.5	2.80	2.8	2.85
4.....		2.85	4.0	6.7	4.5	2.8	2.95	2.85
5.....		2.85	4.0	6.8	4.6	2.85	2.9	2.9
6.....		2.85	3.95	6.7	4.5	2.8	2.75	
7.....		2.75	3.85	7.0	4.5	2.8	2.75	
8.....		2.95	4.0	6.9	4.1	2.85	2.75	
9.....		2.95	4.0	7.0	4.1	2.85	2.85	
10.....		3.05	6.0	7.0	4.0	3.0	2.85	
11.....		3.25	6.0	6.7	4.0	2.85	2.95	
12.....		3.5	6.5	6.9	3.95	2.8	2.95	
13.....		3.5	6.6	6.8	3.95	2.75	2.9	
14.....		3.5	6.8	6.6	3.8	2.75	2.95	
15.....		3.55	6.9	6.3	3.8	2.85	3.05	
16.....		3.85	7.0	6.3	3.7	2.8	3.15	
17.....		3.95	6.9	6.3	3.6	2.8	3.2	
18.....		3.75	7.0	5.8	3.5	3.05	3.1	
19.....		3.65	7.4	5.8	3.5	3.05	3.05	
20.....		3.65	7.7	5.8	3.45	3.05	3.0	
21.....		3.65	7.9	5.7	3.45	3.15	2.95	
22.....		3.45	8.6	5.8	3.4	3.15	2.95	
23.....		3.35	8.2	5.6	3.4	3.05	2.95	
24.....		3.7	8.0	5.6	3.4	2.8	2.95	
25.....		3.75	7.0	5.4	3.35	2.8	2.85	
26.....		3.8	7.0	5.2	3.4	2.75	3.0	
27.....		3.7	7.2	5.1	3.3	2.7	3.0	
28.....		4.0	7.1	5.0	3.2	2.7	3.0	
29.....		3.9	7.3	4.8	3.2	2.7	3.0	
30.....		3.7	7.2	4.8	3.15	2.7	2.95	
31.....	2.85		7.0		3.2	2.65		

Daily discharge, in second-feet, of Sun River at Sun River, Mont., for 1912.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
1.....		420	930	4,320	1,770	520	340	440
2.....		380	965	4,080	1,590	595	340	420
3.....		440	1,080	3,960	1,500	400	400	420
4.....		420	1,080	3,840	1,500	400	460	420
5.....		420	1,080	3,960	1,590	420	440	440
6.....		420	1,040	3,840	1,500	400	380
7.....		380	965	4,200	1,500	400	380
8.....		460	1,080	4,080	1,160	420	380
9.....		460	1,080	4,200	1,160	420	420
10.....		500	3,030	4,200	1,080	480	420
11.....		595	3,030	3,840	1,080	420	460
12.....		740	3,600	4,080	1,040	400	460
13.....		740	3,720	3,960	1,040	380	440
14.....		740	3,960	3,720	930	380	460
15.....		770	4,080	3,360	930	420	500
16.....		965	4,200	3,360	860	400	545
17.....		1,040	4,080	3,360	800	400	570
18.....		895	4,200	2,810	740	500	520
19.....		830	4,680	2,810	740	500	500
20.....		830	5,040	2,810	710	500	480
21.....		830	5,290	2,700	710	545	460
22.....		710	6,200	2,810	680	545	460
23.....		650	5,680	2,590	680	500	460
24.....		860	5,420	2,590	680	400	460
25.....		895	4,200	2,370	650	400	420
26.....		930	4,200	2,160	680	380	480
27.....		860	4,440	2,060	620	360	480
28.....		1,080	4,320	1,960	570	360	480
29.....		1,000	4,560	1,770	570	360	480
30.....		860	4,440	1,770	545	360	460
31.....	420	4,200	570	340

NOTE.—Daily discharge determined from a fairly well-defined rating curve.

Monthly discharge of Sun River at Sun River, Mont., for 1912.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accu- racy.
	Maximum.	Minimum.	Mean.		
April.....	1,080	380	704	41,900	B.
May.....	6,200	930	3,420	210,000	B.
June.....	4,320	1,770	3,250	193,000	B.
July.....	1,770	545	973	59,800	B.
August.....	595	340	429	26,400	B.
September.....	570	340	451	26,800	B.
October 1-5.....	440	420	428	4,240	B.
The period.....	562,000

SOUTH FORK OF NORTH FORK OF SUN RIVER NEAR AUGUSTA, MONT.

Location.—In sec. 27, T. 22 N., R. 10 W., at Warm Springs, about 28 miles northwest of Augusta.

Records available.—May 27, 1911, to September 30, 1912.

Drainage area.—Not measured.

Gage.—The gage is a staff nailed to a post about 10 feet out in the stream. It is difficult to read accurately in high water on account of wave action. There is also a high-water section reading from 5.00 to 10.00 feet and nailed to a tree on the bank, but the water has never reached this stage.

Channel.—Rocky and practically permanent.

Discharge measurements.—Measurements are made from a cable at high and medium stages and by wading near the gage at low stages.

Winter flow.—Affected by ice.

Diversions.—No diversions or storage above this station.

Accuracy.—Conditions for obtaining accurate discharge data are excellent.

Discharge measurements of South Fork of North Fork of Sun River near Augusta, Mont., in 1911 and 1912.

Date.	Hydrographer.	Gage height.	Dis-charge.	Date.	Hydrographer.	Gage height.	Dis-charge.
1911. Oct. 23	W. A. Lamb.....	Feet. 1.06	Sec.-ft. 137	1912. May 27	B. E. Jones.....	Feet. ^b 3.90	Sec.-ft. 2,060
1912. Mar. 31	B. E. Jones.....	a. 45	57	July 9do.....	1.85	438
				Aug. 20do.....	1.17	161

a Some ice. Gage height probably not affected. b Difficult to read gage on account of wave action.

Daily gage height, in feet, of South Fork of North Fork of Sun River near Augusta, Mont., for 1911 and 1912.

[T. F. Ennis, observer.]

Day.	May.	June.	July.	Aug.	Sept.	Oct.	Day.	May.	June.	July.	Aug.	Sept.	Oct.
1911.							1911.						
1.....		3.2	2.8	1.4	1.0	16.....		3.8	1.2
2.....		4.2	2.7	1.3	1.0	17.....		3.7	1.7	1.2	1.1
3.....		4.6	2.6	1.3	1.0	18.....		3.7	1.7	1.1
4.....		4.4	2.6	1.5	1.1	1.1	19.....		3.5	1.6	1.1
5.....		3.9	2.5	1.4	20.....		3.4	1.6	1.1
6.....		3.6	2.4	1.4	1.1	21.....		3.4	1.6	1.1	1.0
7.....		3.9	2.4	1.4	22.....		3.4	1.6	1.1
8.....		4.2	2.2	1.4	23.....		3.3	1.6	1.1
9.....		4.0	2.1	1.3	24.....		3.5	1.5	1.1
10.....		4.0	2.0	1.3	25.....		3.3	1.5	1.1
11.....		3.9	2.0	1.3	1.2	26.....		3.0	1.4	1.1
12.....		4.3	1.9	1.2	27.....		2.3	2.9	1.4	1.1
13.....		4.4	1.9	1.2	28.....		2.2	3.0	1.4	1.0
14.....		4.5	1.8	1.2	29.....		2.2	2.8	1.4	1.0
15.....		4.2	1.8	1.2	30.....		2.2	2.8	1.4	1.0
							31.....		2.6	1.4	1.0
Day.	Apr.	May.	June.	July.	Aug.	Sept.	Day.	Apr.	May.	June.	July.	Aug.	Sept.
1912.							1912.						
1.....		1.7	3.6	2.5	1.45	1.1	16.....	1.3	3.6	3.0	1.65	1.15	1.2
2.....		1.65	3.5	2.4	1.45	17.....	1.35	3.8	2.8	1.6
3.....		1.6	3.3	2.2	1.4	18.....	1.35	3.8	3.0	1.6
4.....		1.55	3.0	1.4	1.2	19.....	1.35	3.6	3.0	1.55
5.....		1.55	3.1	1.3	20.....	1.3	4.2	3.2	1.6	1.2
6.....		1.55	3.2	1.3	1.2	21.....	1.3	4.0	3.2	1.6
7.....		1.75	3.3	1.95	1.3	22.....	1.3	4.0	1.6	1.15
8.....		2.0	3.7	1.90	1.25	23.....	1.4	4.4	1.55
9.....		2.8	4.0	1.25	24.....	1.5	3.4	3.0	1.55
10.....		3.0	3.8	1.25	1.2	25.....	1.5	3.5	2.8	1.55	1.15
11.....		3.0	3.6	1.75	1.25	26.....	1.5	3.8	2.8	1.55
12.....		2.8	3.6	1.75	1.25	27.....	1.5	2.6	1.55	1.1
13.....		2.8	3.8	1.65	1.25	1.2	28.....	1.5	3.6	2.4
14.....	1.2	3.0	3.5	1.65	1.2	29.....	1.6	3.6	1.45
15.....	1.3	3.4	3.2	1.65	1.2	30.....	1.65	3.7	1.45	1.15
							31.....	3.4	1.4

Daily discharge, in second-feet, of South Fork of North Fork of Sun River near Augusta, Mont., for 1911 and 1912.

Day.	May.	June.	July.	Aug.	Sept.	Oct.	Day.	May.	June.	July.	Aug.	Sept.	Oct.
1911.							1911.						
1.....		1,430	1,090	235	128	148	16.....		1,970	390	170	151	145
2.....		2,350	1,010	200	128	148	17.....		1,880	365	170	148	145
3.....		2,740	935	200	128	148	18.....		1,880	365	148	145	145
4.....		2,540	935	275	148	148	19.....		1,700	320	148	140	145
5.....		2,060	860	235	151	148	20.....		1,610	320	148	135	145
6.....		1,790	785	235	154	148	21.....		1,610	320	148	128	140
7.....		2,060	785	235	157	145	22.....		1,610	320	148	130	140
8.....		2,350	645	235	160	145	23.....		1,520	320	148	132	137
9.....		2,160	580	200	163	145	24.....		1,700	275	148	134	135
10.....		2,160	520	200	167	145	25.....		1,520	275	148	136	135
11.....		2,060	520	200	170	145	26.....		1,260	235	148	138	130
12.....		2,440	465	170	166	145	27.....		715	1,170	235	148	140
13.....		2,540	465	170	162	145	28.....		645	1,260	235	128	142
14.....		2,640	415	170	158	145	29.....		645	1,090	235	128	144
15.....		2,350	415	170	155	145	30.....		645	1,090	235	128	146
							31.....		935	235	128	130	130

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Day.	Apr.	May.	June.	July.	Aug.	Sept.
1912.							1912.						
1.....		365	1,790	860	255	148	16.....		200	1,790	1,260	342	159
2.....		342	1,700	785	255	155	17.....		218	1,970	1,090	320	159
3.....		320	1,520	645	235	162	18.....		218	1,970	1,260	320	159
4.....		298	1,260	606	235	170	19.....		218	1,790	1,260	298	159
5.....		298	1,340	568	200	170	20.....		200	2,350	1,430	320	159
6.....		298	1,430	530	200	170	21.....		200	2,160	1,430	320	159
7.....		390	1,520	492	200	170	22.....		200	2,160	1,370	320	159
8.....		520	1,880	465	185	170	23.....		235	1,610	1,320	298	156
9.....		1,090	2,160	440	185	170	24.....		275	1,610	1,260	298	154
10.....		1,260	1,970	415	185	170	25.....		275	1,700	1,090	298	152
11.....		1,260	1,790	390	185	170	26.....		275	1,970	1,090	298	150
12.....		1,090	1,790	390	185	170	27.....		275	1,880	935	298	148
13.....		1,090	1,970	342	185	170	28.....		275	1,790	785	276	148
14.....		170	1,260	1,700	342	170	29.....		320	1,790	810	255	148
15.....		200	1,610	1,430	342	170	30.....		342	1,880	835	255	148
							31.....		1,610	235	148	130	130

NOTE.—Daily discharge determined from a well-defined rating curve based on one measurement made during 1911 and four made during 1912. Discharge interpolated for days for which gage heights are missing. Discharge Oct. 7-31, 1911, estimated from gage height Oct. 6, and discharge measurement Oct. 23.

Monthly discharge of South Fork of North Fork of Sun River near Augusta, Mont., for 1911 and 1912.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accu- racy.
	Maximum.	Minimum.	Mean.		
1911.					
May 27-31.....	935	645	71.7	711	B.
June.....	2,740	1,090	1,880	112,000	B.
July.....	1,090	235	487	29,900	B.
August.....	275	128	176	10,800	B.
September.....	170	128	146	8,690	C.
October.....	148	130	141	8,670	C.
The period.....				171,000	
1912.					
April 14-30.....	342	170	241	8,130	A.
May.....	2,350	298	1,340	82,400	A.
June.....	2,160	785	1,420	84,500	A.
July.....	860	235	399	24,500	A.
August.....	255	148	177	10,900	B.
September.....	170	148	166	9,880	B.
The period.....				220,000	

WILLOW CREEK NEAR AUGUSTA, MONT.

Location.—In the NE. $\frac{1}{4}$ sec. 27, T. 27 N., R. 7 W., at the Clark Co. ranch, just below the mouth of Little Willow Creek, and about 7 miles northwest of Augusta.

Records available.—June 8, 1905, to May 14, 1911, and April 1, 1912, to December 31, 1912.

Drainage area.—Not measured.

Gage.—A standard chain on right bank near observer's house; datum unchanged.

Channel.—Permanent.

Winter flow.—No ice forms at this station, as a large spring enters the creek just above the gage.

Diversions.—The adjudicated water rights above this station amount to 36.2 second-feet from Willow Creek proper and 42.26 second-feet from tributaries. The United States Reclamation Service has an old right of 2.1 second-feet and also has filed on the total flow of the creek, subject to the above prior appropriations. No water is diverted from Willow Creek proper below the station, the amount used by the United States Reclamation Service being diverted from Sun River below the mouth of Willow Creek.

Storage.—Willow Creek dam, located about 2 miles below the station, provides a reservoir with a capacity of 84,320 acre-feet for use on the Fort Shaw unit of Sun River project.

Accuracy.—Conditions for obtaining accurate discharge data are excellent.

Discharge measurements of Willow Creek near Augusta, Mont., in 1912.

Date.	Hydrographer.	Gage height.	Dis-charge.	Date.	Hydrographer.	Gage height.	Dis-charge.
		<i>Feet.</i>	<i>Sec.-ft.</i>			<i>Feet.</i>	<i>Sec.-ft.</i>
Mar. 29	B. E. Jones.....	1.92	54	July 12	B. E. Jones.....	1.55	40
May 23do.....	5.25	283	Aug. 14do.....	0.96	12.2
May 29do.....	3.72	153				

Daily gage height, in feet, of Willow Creek near Augusta, Mont., for 1912.

[Elizabeth Ireland, observer.]

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1.....		1.30	1.5	3.2	1.55	1.25	0.95	1.0	1.0
2.....		1.38	1.6	3.0	1.65	1.3	.95	1.0	1.1
3.....		1.58	1.5	3.0	1.6	1.3	.95	1.0	1.1
4.....		1.58	1.5	2.8	1.5	1.25	1.0	1.0	1.1
5.....		1.40	1.5	2.8	1.65	1.2	1.0	1.0	1.1
6.....		1.08	1.5	2.6	1.55	1.15	1.0	1.0	1.1
7.....		1.15	1.5	2.6	1.55	1.15	1.0	1.0	1.1
8.....		1.22	1.6	2.6	1.55	1.15	.95	1.0	1.1
9.....		1.32	1.9	2.6	1.55	1.15	.95	1.0	1.1
10.....		1.38	2.0	2.5	1.45	1.15	.95	1.0
11.....		1.38	1.9	2.4	1.5	1.15	.95	1.0
12.....		1.50	1.85	2.35	1.5	1.1	.95	1.0
13.....		1.38	1.8	2.3	1.5	1.1	1.0	1.0
14.....		1.25	1.8	2.2	1.55	1.1	1.0	1.0
15.....		1.3	1.8	2.2	1.55	1.05	1.0	1.0
16.....		1.4	1.95	2.35	1.6	1.05	1.0	1.0
17.....		1.45	2.0	2.0	1.6	1.0	.95	1.05
18.....		1.5	1.95	2.0	1.5	1.1	.95	1.05
19.....		1.55	2.0	1.9	1.5	1.15	.95	1.05
20.....		1.5	2.4	1.8	1.5	1.1	.95	1.05
21.....		1.4	5.3	1.6	1.5	1.05	.95	1.05
22.....		1.45	5.3	1.5	1.45	1.0	.95	1.05
23.....		1.5	5.0	1.4	1.4	1.0	.95	1.05
24.....		1.5	4.2	1.35	1.35	.95	1.0	1.05
25.....		1.45	4.2	1.3	1.3	.95	1.0	1.05
26.....		1.4	4.2	1.25	1.3	.95	1.0	1.05
27.....		1.4	4.0	1.2	1.25	.95	1.0	1.05
28.....		1.45	3.8	1.1	1.25	.95	1.0	1.05
29.....	1.9	1.5	3.7	1.1	1.2	.95	1.0	1.05
30.....	1.28	1.5	3.6	1.1	1.2	.95	1.0	1.0
31.....	1.25	3.4	1.15	.95	1.0

Daily discharge, in second-feet, of Willow Creek near Augusta, Mont., for 1912.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1.....		25	33	124	36	23	12	13	13
2.....		28	38	112	40	25	12	13	17
3.....		37	33	112	38	25	12	13	17
4.....		37	33	100	33	23	13	13	17
5.....		29	33	100	40	21	13	13	17
6.....		16	33	88	36	19	13	13	17
7.....		19	33	88	36	19	13	13	17
8.....		22	38	88	36	19	12	13	17
9.....		26	53	88	36	19	12	13	17
10.....		28	58	83	31	19	12	13	
11.....		28	53	78	33	19	12	13	
12.....		33	50	76	33	17	12	13	
13.....		28	48	73	33	17	13	13	
14.....		23	48	68	36	17	13	13	
15.....		25	48	68	36	15	13	13	
16.....		29	56	76	38	15	13	13	
17.....		31	58	58	38	13	12	15	
18.....		33	56	58	33	17	12	15	
19.....		36	58	53	33	19	12	15	
20.....		33	78	48	33	17	12	15	
21.....		29	280	38	33	15	12	15	
22.....		31	280	33	31	13	12	15	
23.....		33	254	29	29	13	12	15	
24.....		33	192	27	27	12	13	15	
25.....		31	192	25	25	12	13	15	
26.....		29	192	23	25	12	13	15	
27.....		29	178	21	23	12	13	15	
28.....		31	164	17	23	12	13	15	
29.....		53	33	157	17	21	12	13	
30.....		24	33	150	17	21	12	13	
31.....		23	136		19	12		13	

NOTE.—Daily discharge determined from a fairly well-defined rating curve.

Monthly discharge of Willow Creek near Augusta, Mont., for 1912.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accu- racy.
	Maximum.	Minimum.	Mean.		
April.....	37	16	29.3	1,740	B.
May.....	280	33	100	6,150	B.
June.....	124	17	62.9	3,740	B.
July.....	40	19	31.8	1,960	B.
August.....	25	12	16.6	1,020	B.
September.....	13	12	12.5	744	B.
October.....	15	13	13.8	848	B.
November 1-9.....	17	13	16.6	296	B.
The period.....				16,500	

SMITH CREEK NEAR AUGUSTA, MONT.

Location.—In the NW. $\frac{1}{4}$ sec. 17, T. 19 N., R. 8 W., at a point 1 mile above J. W.

Nixon's ranch, 16 miles southwest of Augusta, Mont.

Records available.—April 14, 1906, to November 16, 1912.

Drainage area.—26 square miles.

Gage.—Inclined staff fastened to a bowlder on the left bank just above the ford.

Channel.—Shifts during high stages.

Discharge measurements.—Made by wading.

Winter flow.—Open entire year.

Diversions.—The ordinary summer flow of this creek is practically all used for irrigation, but no water is diverted above the gaging station. The United States Reclamation Service has filed on the total unappropriated flow of the creek. The adjudicated rights prior to those of the United States Reclamation Service amount to 64.25 second-feet from Smith Creek proper, 46.40 second-feet from Ford Creek, and 8.12 second-feet from two small tributaries.

Discharge measurements of Smith Creek near Augusta, Mont., in 1912.

Date.	Hydrographer.	Gage height.	Dis-charge.	Date.	Hydrographer.	Gage height.	Dis-charge.
		<i>Feet.</i>	<i>Sec.-ft.</i>			<i>Feet.</i>	<i>Sec.-ft.</i>
Mar. 28	B. E. Jones.....	0.43	11.6	June 28	B. E. Jones.....	0.81	36
May 21do.....	1.83	283	Aug. 12do.....	.64	17.2
30do.....	1.30	133				

Daily gage height, in feet, of Smith Creek near Augusta, Mont., for 1912.

[Mrs. J. W. Nixon, observer.]

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1.....		0.42	0.88	1.2	0.8	0.65	0.6	0.6	0.8
2.....		.45	.88	1.15	.9	.65	.6	.6	.8
3.....		.45	.85	1.1	.95	.65	.6	.6	.8
4.....		.5	.85	1.1	.9	.65	.6	.6	.75
5.....		.5	.88	1.10	.9	.65	.6	.6	.75
6.....		.55	.90	1.08	.85	.65	.6	.6	.75
7.....		.65	.90	1.05	.8	.62	.6	.6	.75
8.....		.8	1.02	1.05	.8	.62	.6	.65	.7
9.....		1.0	1.10	1.05	.8	.62	.6	.7	.7
10.....		1.15	1.11	1.05	.8	.62	.6	.7	.75
11.....		1.15	1.2	1.05	.8	.62	.6	.7	.8
12.....		1.05	1.2	1.05	.8	.60	.6	.7	.8
13.....		1.05	1.15	1.0	.80	.6	.6	.7	.8
14.....		1.0	1.15	1.0	.82	.6	.6	.75	.8
15.....		1.0	1.15	1.0	.82	.6	.6	.75	.8
16.....		.95	1.15	1.0	.82	.6	.6	.75	.8
17.....		.9	1.18	1.0	.80	.6	.6	.8
18.....		.8	1.18	1.0	.8	.6	.6	.8
19.....		.75	1.18	.95	.75	.7	.6	.8
20.....		.7	2.10	.95	.75	.7	.6	.8
21.....		.75	1.8	.9	.75	.65	.6	.8
22.....		.8	2.5	.9	.75	.65	.6	.8
23.....		.80	2.1	.90	.7	.6	.6	.8
24.....		.82	1.9	.88	.7	.6	.6	.85
25.....		.82	1.7	.85	.7	.6	.6	.85
26.....		.85	1.6	.85	.7	.6	.6	.85
27.....		.85	1.55	.8	.7	.6	.6	.85
28.....		.85	1.5	.8	.7	.6	.6	.85
29.....		.42	.88	1.4	.8	.7	.6	.8
30.....		.42	.88	1.3	.8	.65	.6	.8
31.....		.42	1.2565	.6	.8

Daily discharge, in second-feet, of Smith Creek near Augusta, Mont., for 1912.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1.....		10	59	108	34	18	14	14	34
2.....		12	59	97	48	18	14	14	34
3.....		12	54	86	57	18	14	14	34
4.....		15	54	86	48	18	14	14	28
5.....		15	59	86	48	18	14	14	28
6.....		19	62	82	41	18	14	14	28
7.....		28	62	76	34	16	14	14	28
8.....		47	84	76	34	16	14	18	23
9.....		80	98	76	34	16	14	23	23
10.....		108	98	76	34	16	14	23	28

Daily discharge, in second-feet, of Smith Creek near Augusta, Mont., for 1912—Continued.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
11.....		108	119	76	34	16	14	23	34
12.....		89	119	76	34	14	14	23	34
13.....		89	108	66	34	14	14	23	34
14.....		80	108	66	37	14	14	28	34
15.....		80	108	66	37	14	14	28	34
16.....		71	108	66	37	14	14	28	34
17.....		62	115	66	34	14	14	34
18.....		47	115	66	34	14	14	34
19.....		40	115	57	28	23	14	34
20.....		34	364	57	28	23	14	34
21.....		40	274	48	28	18	14	34
22.....		47	484	48	28	18	14	34
23.....		47	364	48	23	14	14	34
24.....		50	304	45	23	14	14	41
25.....		50	244	41	23	14	14	41
26.....		54	216	41	23	14	14	41
27.....		54	202	34	23	14	14	41
28.....	10	54	188	34	23	14	14	41
29.....	10	59	160	34	23	14	14	34
30.....	10	59	133	34	18	14	14	34
31.....	10	120	18	14	34

NOTE.—Daily discharge determined from a rating curve well defined below 300 second-feet. Discharge Mar. 1-27 estimated at 10 second-feet.

Monthly discharge of Smith Creek near Augusta, Mont., for 1912.

[Drainage area, 26 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
January.....			a 7.0	0.269	0.31	430	D.
February.....			a 7.0	.269	.29	403	D.
March.....			10.0	.385	.44	615	D.
April.....	108	10	52.0	2.00	2.23	3,090	A.
May.....	484	54	153	5.88	6.78	9,410	B.
June.....	108	34	63.9	2.46	2.74	3,800	A.
July.....	57	18	32.3	1.24	1.43	1,990	A.
August.....	23	14	15.9	.612	.71	978	A.
September.....	14	14	14.0	.538	.60	833	A.
October.....	41	14	27.7	1.07	1.23	1,700	A.
November 1-16.....	34	23	30.8	1.18	.70	977	A.
The period.....						24,200	

a Estimated.

SOUTH FORK OF SUN RIVER AT AUGUSTA, MONT.

Location.—In sec. 17, T. 20 N., R. 6 W., at the highway bridge on the road from Augusta to Craig, Mont., about half a mile from Augusta.

Records available.—December 2, 1904, to December 31, 1912, except during frozen periods.

Drainage area.—Not measured.

Gage.—The original gage was spiked to the cribwork of the right abutment on the downstream side of the bridge; a new gage was installed April 17, 1907, at a different datum and was used during 1907 and 1908; records for 1909-1912 are referred to the old gage.

Channel.—Shifting.

Discharge measurements.—High-stage measurements are made from the bridge at the gage. Low-stage measurements are made by wading.

Winter flow.—Affected by ice.

Diversions.—Water is diverted to irrigate the valley lands both above and below the station. During dry seasons the entire summer flow is utilized. Adjudicated water rights above the station amount to 70.16 second-feet from South Fork of Sun River proper and 196.68 second-feet from tributaries. Below the station there are adjudicated rights amounting to 50.70 second-feet, all from South Fork of Sun River direct.

Accuracy.—Results good.

Discharge measurements of South Fork of Sun River at Augusta, Mont., in 1912.

Date.	Hydrographer.	Gage height.	Dis-charge.	Date.	Hydrographer.	Gage height.	Dis-charge.
		<i>Feet.</i>	<i>Sec.-ft.</i>			<i>Feet.</i>	<i>Sec.-ft.</i>
Mar. 29	B. E. Jones.....	a 1.64	98	June 21	B. E. Jones.....	1.88	134
May 22do.....	b 3.78	1,690	Aug. 5do.....	1.52	46
31do.....	b 2.51	442	26do.....	1.28	17.3

a May be affected by ice.

b Overflow channels not passing gage included.

Daily gage height, in feet, of South Fork of Sun River at Augusta, Mont., for 1912.

[W. J. Auchard, observer.]

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1.....		1.5	1.7	2.5	1.7	1.5	1.2	1.4	1.6
2.....		1.5	1.7	2.5	1.8	1.5	1.3	1.5	1.6
3.....		1.5	1.7	2.3	1.7	1.6	1.3	1.5	1.7
4.....		1.4	1.6	2.4	1.8	1.6	1.3	1.6	1.7
5.....		1.5	1.7	2.3	1.8	1.6	1.6	1.6	1.5
6.....		1.5	1.7	2.3	1.8	1.5	1.5	1.5	1.6
7.....		1.4	1.7	2.2	1.8	1.4	1.5	1.6	1.6
8.....		1.4	1.7	2.1	1.7	1.5	1.4	1.6	1.6
9.....		1.4	1.8	2.2	1.7	1.5	1.4	1.6	1.6
10.....		1.5	2.0	2.2	1.7	1.4	1.4	1.6	1.5
11.....		1.5	2.0	2.1	1.7	1.4	1.3	1.5
12.....		1.5	1.9	2.1	1.7	1.3	1.4	1.6
13.....		1.5	1.9	1.9	1.6	1.4	1.4	1.6
14.....		1.4	1.8	2.0	1.7	1.4	1.4	1.6
15.....		1.5	1.9	2.0	1.7	1.3	1.4	1.6
16.....		1.5	1.9	2.0	1.7	1.3	1.3	1.5
17.....		1.5	2.0	2.0	1.7	1.2	1.4	1.6
18.....		1.6	2.0	1.9	1.6	1.3	1.4	1.6
19.....		1.5	1.9	1.9	1.7	1.4	1.4	1.6
20.....		1.6	2.1	1.9	1.7	1.4	1.4	1.6
21.....		1.6	3.8	1.9	1.7	1.4	1.3	1.5
22.....		1.6	3.9	1.9	1.7	1.3	1.4	1.6
23.....		1.6	3.3	1.7	1.6	1.4	1.4	1.6
24.....		1.5	2.7	1.8	1.7	1.3	1.4	1.6
25.....		1.6	2.9	1.8	1.6	1.3	1.4	1.6
26.....		1.6	3.0	1.8	1.6	1.3	1.3	1.5
27.....		1.6	2.8	1.8	1.6	1.2	1.4	1.6
28.....	1.6	1.6	2.7	1.6	1.5	1.3	1.4	1.7
29.....	1.7	1.5	2.5	1.7	1.6	1.3	1.4	1.7
30.....	1.4	1.7	2.6	1.7	1.6	1.3	1.4	1.7
31.....	1.4	2.5	1.6	1.3	1.4

Daily discharge, in second-feet, of South Fork of Sun River near Augusta, Mont., for 1912.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1.....		65	120	440	82	44	10	30	60
2.....		65	120	440	108	44	20	44	60
3.....		65	120	310	82	60	20	44	82
4.....		45	90	370	108	60	20	60	82
5.....		65	120	310	108	60	60	60	44
6.....		65	120	310	108	44	44	44	60
7.....		45	120	260	108	30	44	60	60
8.....		45	120	220	82	44	30	60	60
9.....		45	160	260	82	44	30	60	60
10.....		65	245	260	82	30	30	60	44
11.....		65	245	220	82	30	20	44
12.....		65	200	220	82	20	30	60
13.....		65	200	142	60	30	30	60
14.....		45	160	180	82	30	30	60
15.....		65	200	180	82	20	30	60
16.....		65	200	180	82	20	20	44
17.....		65	245	180	82	10	30	60
18.....		90	245	142	60	20	30	60
19.....		65	200	142	82	30	30	60
20.....		90	290	142	82	30	30	60
21.....		90	1,720	142	82	30	20	44
22.....		90	1,840	142	82	20	30	60
23.....		90	1,130	82	60	30	30	60
24.....		65	580	108	82	20	30	60
25.....		90	740	108	60	20	30	60
26.....		90	830	108	60	20	20	44
27.....		90	660	108	60	10	30	60
28.....	90	90	580	60	44	20	30	82
29.....	120	65	440	82	60	20	30	82
30.....	45	120	510	82	60	20	30	82
31.....	45	440	60	20	30

NOTE.—Daily discharge determined from two well-defined rating curves which merge above 4 feet. The first applies to May 20 and the second after May 20.

Monthly discharge of South Fork of Sun River near Augusta, Mont., for 1912.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accu- racy.
	Maximum.	Minimum.	Mean.		
April.....	120	45	71.0	4,220	A.
May.....	1,840	90	419	25,800	B.
June.....	440	60	198	11,800	A.
July.....	108	44	78.6	4,830	A.
August.....	60	10	30.0	1,840	A.
September.....	60	10	28.9	1,720	A.
October.....	82	30	56.6	3,480	A.
November 1-10.....	82	44	61.2	1,210	A.
The period.....	54,900

FORD CREEK NEAR AUGUSTA, MONT.

Location.—In the SE. $\frac{1}{4}$ sec. 31, T. 20 N., R. 8 W., at the ranch of Joseph Ford, 16 miles west of Augusta, Mont. Ford Creek has no tributary.

Records available.—April 11, 1906, to December 31, 1912, except during frozen periods.

Drainage area.—18 square miles.

Gage.—Staff on the left bank near the observer's house; datum unchanged.

Channel.—Shifting; current swift.

Discharge measurements.—Made by wading.

Winter flow.—Little affected by ice.

Diversions.—One irrigation ditch with an adjudicated right of 37.50 second-feet and an ordinary flow of about 5.0 second-feet diverts water from the creek above the gage. The total adjudicated rights on Ford Creek prior to the United States Reclamation Service filings amount to 46.40 second-feet. The Reclamation Service has filed on the total unappropriated flow of the creek.

Accuracy.—As conditions of flow are changeable, frequent discharge measurements are necessary to properly define the rating curve.

Discharge measurements of Ford Creek near Augusta, Mont., in 1912.

Date.	Hydrographer.	Gage height.	Dis-charge.	Date.	Hydrographer.	Gage height.	Dis-charge.
		<i>Feet.</i>	<i>Sec.-feet.</i>			<i>Feet</i>	<i>Sec.-ft.</i>
Mar. 28	B. E. Jones.....	0.91	9.5	June 27	B. E. Jones.....	1.53	38
May 21do.....	2.25	135	Aug. 9do.....	1.30	22
30do.....	2.07	108				

Daily gage height, in feet, of Ford Creek near Augusta, Mont., for 1912.

[Mrs. J. W. Nixon, observer.]

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1.....	1.2	1.45	2.15	1.5	1.4	1.2	1.15	1.35
2.....	1.2	1.45	2.05	1.6	1.35	1.2	1.15	1.35
3.....	1.2	1.4	2.0	1.7	1.35	1.2	1.15	1.35
4.....	1.25	1.4	1.95	1.65	1.35	1.2	1.15	1.35
5.....	1.3	1.5	1.95	1.6	1.35	1.2	1.15	1.3
6.....	1.3	1.5	1.95	1.55	1.3	1.2	1.15	1.3
7.....	1.3	1.6	1.9	1.55	1.3	1.15	1.15	1.3
8.....	1.35	1.6	1.9	1.45	1.3	1.15	1.2	1.3
9.....	1.35	1.6	1.75	1.5	1.3	1.15	1.2	1.35
10.....	1.35	1.65	1.7	1.5	1.3	1.15	1.2	1.35
11.....	1.3	1.75	1.75	1.45	1.3	1.15	1.25	1.35
12.....	1.3	1.75	1.7	1.5	1.3	1.15	1.25	1.4
13.....	1.2	1.7	1.7	1.45	1.3	1.15	1.25	1.4
14.....	1.2	1.7	1.65	1.5	1.3	1.15	1.25	1.4
15.....	1.2	1.75	1.65	1.5	1.3	1.15	1.25	1.4
16.....	1.2	1.75	1.7	1.45	1.3	1.15	1.25	1.4
17.....	1.25	1.8	1.65	1.5	1.3	1.15	1.3
18.....	1.3	1.8	1.7	1.45	1.3	1.15	1.3
19.....	1.3	1.8	1.6	1.5	1.35	1.15	1.3
20.....	1.35	2.7	1.6	1.5	1.4	1.15	1.35
21.....	1.35	2.45	1.6	1.45	1.3	1.15	1.35
22.....	1.4	2.5	1.55	1.5	1.2	1.15	1.35
23.....	1.4	2.35	1.6	1.5	1.2	1.15	1.4
24.....	1.45	2.2	1.55	1.5	1.2	1.15	1.4
25.....	1.5	2.15	1.5	1.45	1.2	1.15	1.4
26.....	1.5	2.15	1.55	1.4	1.2	1.15	1.4
27.....	1.5	2.2	1.5	1.45	1.2	1.15	1.4
28.....	1.5	2.1	1.5	1.45	1.2	1.15	1.35
29.....	1.5	2.15	1.5	1.4	1.2	1.15	1.35
30.....	1.45	2.1	1.5	1.4	1.2	1.15	1.35
31.....		2.1	1.4	1.2	1.35

Daily discharge, in second-feet, of Ford Creek near Augusta, Mont., for 1912.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1.....	17	32	119	36	29	17	15	26
2.....	17	32	104	46	26	17	15	26
3.....	17	29	96	56	26	17	15	26
4.....	20	29	89	51	26	17	15	26
5.....	23	36	89	46	26	17	15	23
6.....	23	36	89	41	23	17	15	23
7.....	23	46	82	41	23	15	15	23
8.....	26	46	82	32	23	15	17	23
9.....	26	46	62	36	23	15	17	26
10.....	26	51	56	36	23	15	17	26
11.....	23	62	62	32	23	15	20	26
12.....	23	62	56	36	23	15	20	29
13.....	17	56	56	32	23	15	20	29
14.....	17	56	51	36	23	15	20	29
15.....	17	62	51	36	23	15	20	29
16.....	17	62	56	32	23	15	20	29
17.....	20	68	51	36	23	15	23
18.....	23	68	56	32	23	15	23
19.....	23	68	46	36	26	15	23
20.....	26	216	46	36	29	15	26
21.....	26	169	46	32	23	15	26
22.....	29	178	41	36	17	15	26
23.....	29	152	46	36	17	15	29
24.....	32	127	41	36	17	15	29
25.....	36	119	36	32	17	15	29
26.....	36	119	41	29	17	15	29
27.....	36	127	36	32	17	15	29
28.....	36	111	36	32	17	15	26
29.....	36	119	36	29	17	15	26
30.....	32	111	36	29	17	15	26
31.....	111	29	17	26

NOTE.—Daily discharge determined from a rating curve well defined for discharges from 15 to 140 second-feet and fairly well defined at other stages.

Monthly discharge of Ford Creek near Augusta, Mont., for 1912.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accu- racy.
	Maximum.	Minimum.	Mean.		
April.....	36	17	25.1	1,490	A.
May.....	216	29	84.1	5,170	B.
June.....	119	36	59.8	3,560	A.
July.....	56	29	36.0	2,210	A.
August.....	29	17	21.9	1,350	A.
September.....	17	15	15.4	916	A.
October.....	29	15	21.7	1,330	A.
November 1-16.....	29	23	26.2	831	A.
The period.....	16,900

SUN RIVER CANALS.

FLOWEREE BIG CANAL NEAR AUGUSTA, MONT.

Location.—In NW. $\frac{1}{4}$ sec. 27, T. 21 N., R. 6 W., 300 feet below where the Augusta-Chouteau road crosses the canal and about 4 miles north of Augusta.

Records available.—June 6, 1912, to October 25, 1912.

Gage.—A vertical staff nailed to a post driven into the bed of the canal.

Channel.—Practically permanent on account of the low velocities of the canal.

Discharge measurements.—Measurements are made by wading near the gage.

Winter flow.—None.

Diversions.—No water is taken out of the canal between the headworks and the station.

Accuracy.—The conditions for obtaining accurate discharge data are excellent.

Discharge measurements of Floweree Big canal near Augusta, Mont., in 1912.

Date.	Hydrographer.	Gage height.	Discharge.
		<i>Feet.</i>	<i>Sec.-ft.</i>
June 6	B. E. Jones.....	3.98	51
July 11do.....	3.82	43
Aug. 26do.....	4.13	58

NOTE.—Observer notes that on Aug. 7 with a gage height of 2.58 feet there was no water flowing, so the point of zero flow was assumed at 2.60 feet.

Daily gage height, in feet, and discharge, in second-feet, of Floweree Big canal near Augusta, Mont., for 1912.

[L. M. Wagner, observer.]

Day.	June.		July.		August.		September.		October.	
	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
1.....				86	4.5	76	4.15	59	2.58	0.0
2.....			4.7	86		78		59		.0
3.....				86	4.6	81	4.15	59	2.50	.0
4.....			4.7	86		78		56		.0
5.....				61	4.50	76	4.0	52	2.28	.0
6.....	4.0	52	3.65	36		38		42		.0
7.....	4.0	52		35	2.56	0.0	3.55	32	2.26	.0
8.....	4.0	52	3.6	34		0.0		32		.0
9.....	4.1	56		34	2.38	0.0	3.55	32		.0
10.....		54	3.6	34		0.0		31		35
11.....	4.0	52		43	3.65	36	3.50	30	4.40	71
12.....	4.0	52	3.8	43		40		30		42
13.....	4.05	54		40	3.8	43	3.48	29	3.03	13
14.....	4.0	52	3.7	38		42		27		9.0
15.....		55		38	3.75	41	3.38	25	2.78	4.9
16.....	4.15	59	3.7	38		45		25		2.4
17.....	4.05	54		42	3.95	50	3.38	25	2.30	.0
18.....	4.05	54		45		57		22		.0
19.....	4.1	56		49	4.25	64	3.20	19	2.28	.0
20.....	4.1	56	4.0	52		61		18		5.0
21.....	4.1	56		52	4.15	59	3.13	17	2.94	9.9
22.....	4.1	56	4.0	52		59		16		9.4
23.....	4.1	56		52	4.15	59	3.08	15	2.91	8.8
24.....		74	4.0	52		59		14		6.6
25.....	4.8	92		52	4.15	59	3.03	13	2.76	4.3
26.....		92	4.0	52		58		8.2		
27.....	4.8	92		52	4.1	56	2.73	3.4		
28.....	4.8	92	4.0	52		56		2.7		
29.....		89		51	4.1	56	2.68	2.0		
30.....	4.7	86	3.95	50		58		1.0		
31.....				63	4.15	59				

• Discharge measurement.

NOTE.—Gage read Nov. 2-26 but no water was flowing, so gage heights are omitted. Daily discharge determined from a well-defined rating curve.

Monthly discharge of Floweree Big canal near Augusta, Mont., for 1912.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
June 6-30.....	92	52	63.8	3,160	A.
July.....	86	34	51.2	3,150	A.
August.....	81	0	49.8	3,060	A.
September.....	59	1.0	26.5	1,580	A.
October 1-25.....	71	0	8.85	439	B.

NOTE.—Canal dry after Nov. 1.

CROWN BUTTE CANAL AT RIEBELING, MONT.

Location.—In NW. $\frac{1}{4}$ sec. 8, T. 20 N., R. 4 W., at the new railroad station of Riebeling, about 15 miles east of Augusta. The gage is about half a mile below the head of the canal.

Records available.—June 3, 1912, to September 30, 1912.

Gage.—A staff gage nailed to a post near the left bank.

Channel.—Permanent.

Discharge measurements.—Made by wading at the gage.

Winter flow.—None.

Diversions.—No water is diverted from the canal above the station.

Accuracy.—Conditions for obtaining accurate discharge data are excellent.

Discharge measurements of Crown Butte canal at Riebeling, Mont., in 1912.

Date.	Hydrographer.	Gage height.	Discharge.
		<i>Feet.</i>	<i>Sec.-ft.</i>
June 3	B. E. Jones.....	3.00	34
17	do.....	3.36	62
July 15	do.....	3.18	46
Aug. 28	do.....	3.08	39

Daily gage height, in feet, and discharge, in second-feet, of Crown Butte canal at Riebeling, Mont., for 1912.

[C. F. Eder, observer.]

Day.	June.		July.		August.		September.	
	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
1.....			3.18	45.6	3.12	41.4	3.16	44.2
2.....			3.15	43.5	3.15	43.5	3.16	44.2
3.....	3.00	34.0	3.15	43.5	2.67	18.8	3.16	44.2
4.....	3.00	34.0	3.12	41.4	2.87	27.5	3.21	47.9
5.....	3.00	34.0	3.10	40.0	2.87	27.5	2.58	15.4
6.....	2.98	33.0	3.12	41.4	2.87	27.5	2.56	14.8
7.....	2.98	33.0	3.10	40.0	3.02	35.2	2.56	14.8
8.....	3.00	34.0	3.08	38.8	2.99	33.5	2.56	14.8
9.....	3.00	34.0	3.08	38.8	2.99	33.5	2.56	14.8
10.....	3.00	34.0	3.08	38.8	2.99	33.5	2.11	4.0
11.....	3.00	34.0	3.10	40.0	2.97	32.5	2.11	4.0
12.....	3.00	34.0	3.18	45.6	2.96	32.0	2.11	4.0
13.....	3.00	34.0	3.18	45.6	2.96	32.0	2.11	4.0
14.....	3.00	34.0	3.18	45.6	2.96	32.0	2.11	4.0
15.....	3.02	35.2	3.18	45.6	2.96	32.0	2.11	4.0
16.....	3.00	34.0	3.16	44.2	2.96	32.0	2.08	3.4
17.....	3.36	62.6	3.16	44.2	3.06	37.6	2.08	3.4
18.....	2.81	24.5	3.16	44.2	3.06	37.6	2.11	4.0
19.....	2.82	25.0	3.16	44.2	2.56	14.8	2.11	4.0
20.....	3.20	47.0	3.10	40.0	2.58	15.4	2.11	4.0
21.....	3.20	47.0	3.10	40.0	2.58	15.4	2.08	3.4
22.....	3.10	40.0	3.08	38.8	2.58	15.4	2.08	3.4
23.....	3.10	40.0	3.08	38.8	2.96	32.0	2.08	3.4
24.....	3.18	45.6	3.08	38.8	2.96	32.0	2.08	3.4
25.....	3.18	45.6	3.18	45.6	2.96	32.0	2.08	3.4
26.....	3.18	45.6	3.17	44.9	2.96	32.0	2.08	3.4
27.....	3.12	41.4	3.17	44.9	2.96	32.0	2.11	4.0
28.....	3.25	51.5	3.17	44.9	3.06	37.6	2.11	4.0
29.....	3.22	48.8	3.17	44.9	3.08	38.8	2.11	4.0
30.....	3.22	48.8	3.15	43.5	3.08	38.8		4.0
31.....			3.12	41.4	3.11	40.7		

NOTE.—Daily discharge determined from a rating curve well defined above and poorly defined below a gage height of 3 feet. Discharge Sept. 30 estimated.

Monthly discharge of Crown Butte canal at Riebeling, Mont., for 1912.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accu- racy.
	Maximum.	Minimum.	Mean.		
June 3-30.....	62.6	24.5	38.9	2,160	A.
July.....	45.6	38.8	42.5	2,610	A.
August.....	43.5	14.8	31.2	1,920	A.
September.....	47.9	3.4	11.1	660	B.

CROWN BUTTE CANAL NEAR SIMMS, MONT.

Location.—In the SW. $\frac{1}{4}$ sec. 8, T. 20 N., R. 3 W., where the county road crosses the canal, about 6 miles above Simms, and $8\frac{1}{2}$ miles along the canal, below the head-works of the canal.

Records available.—June 9, 1912, to August 17, 1912.

Gage.—A vertical staff nailed to the bridge near the center of the canal.

Channel.—Shifts slightly.

Discharge measurements.—Measurements are made by wading near the gage.

Winter flow.—None.

Diversions.—During 1912 no water was taken from the canal for use above this station, the losses being due to leakage.

Accuracy.—The results obtained should be fairly good.

Discharge measurements of Crown Butte canal near Simms, Mont., in 1912.

Date.	Hydrographer.	Gage height.	Dis- charge.
		<i>Feet.</i>	<i>Sec.-ft.</i>
June 3	B. E. Jones.....	3.00	29
July 15do.....	3.28	35
Aug. 1do.....	3.23	32
28do.....	3.19	31

NOTE.—The following points were computed, by Kutter's formula, from data observed on June 3. Gage height 2 feet, discharge 4.5 second-feet; gage height 2.50 feet, discharge 14.0 second-feet.

Daily gage height, in feet, and discharge, in second-feet, of Crown Butte canal near Simms, Mont., for 1912.

[Wm. A. Thorp, observer.]

Day.	June.		July.		August.		September.	
	Gage height.	Dis- charge.	Gage height.	Dis- charge.	Gage height.	Dis- charge.	Gage height.	Dis- charge.
1.....			3.3	36.5	3.2	31.0		
2.....			3.2	32.8	3.2	31.0		
3.....			3.2	32.8	3.2	31.0		
4.....			3.2	32.8	2.6	13.0		
5.....			3.2	32.8	2.9	21.0	2.5	10.8
6.....			3.2	31.7	2.9	21.0		
7.....			3.2	31.7	2.9	21.0		
8.....			3.2	31.7		24.2		
9.....			3.2	31.7	3.1	27.5		
10.....	3.0	28.9	3.2	31.7	3.1	27.5		
11.....	3.0	28.9	3.2	31.4	3.0	24.0		
12.....	3.0	28.9	3.2	31.4	3.0	24.0		
13.....	3.0	28.9	3.2	31.4	3.0	24.0		
14.....	3.0	28.9	3.2	31.4	3.0	24.0		
15.....	3.0	28.9	3.2	31.4	3.0	24.0		

Daily gage height, in feet, and discharge, in second-feet, of Crown Butte canal near Simms, Mont., for 1912—Continued.

Day.	June.		July.		August.		September.	
	Gage height.	Dis-charge.	Gage height.	Dis-charge.	Gage height.	Dis-charge.	Gage height.	Dis-charge.
16.....	3.0	27.5	3.2	31.0	3.0	24.0
17.....	3.2	34.5	3.2	31.0
18.....	2.8	21.0	3.2	31.0
19.....	2.8	21.0	3.2	31.0
20.....	3.2	34.5	3.2	31.0
21.....	3.2	33.8	3.2	31.0
22.....	3.2	33.8	3.2	31.0
23.....	3.2	33.8	3.1	27.5
24.....	3.2	33.8	3.1	27.5
25.....	3.2	33.8	3.1	27.5
26.....	3.2	33.4	3.2	31.0
27.....	3.2	33.4	3.2	31.0
28.....	3.3	37.3	3.2	31.0
29.....	3.3	37.3	3.2	31.0
30.....	3.3	37.3	3.2	31.0	3.2	31.0
31.....	3.2	31.0

NOTE.—Daily discharge obtained by shifting-channel methods June 10 to July 14 and from a fairly well-defined rating curve after July 14. Discharge interpolated Aug. 8.

Monthly discharge of Crown Butte canal near Simms, Mont., for 1912.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accu- racy.
	Maximum.	Minimum.	Mean.		
June 9-30.....	37.3	21.0	31.4	1,310	C.
July.....	36.5	27.5	31.2	1,920	B.
August 17 days.....	31.0	13.0	24.9	840	B.

SUN RIVER CANAL NEAR SUN RIVER, MONT.

Location.—In SE. $\frac{1}{4}$ sec. 28, T. 21 N., R. 1 W., about half a mile up Sun River from the town of Sun River. The gage is located about half a mile below the head of the canal.

Records available.—June 4, 1912, to November 9, 1912.

Gage.—A vertical staff nailed to a post driven into the bed of the canal.

Discharge measurements.—Made by wading at the gage.

Channel.—Fairly permanent.

Winter flow.—None.

Diversions.—No water is diverted from the canal above this point.

Accuracy.—Results good.

Discharge measurements of Sun River canal near Sun River, Mont., in 1912.

Date.	Hydrographer.	Gage height.	Dis-charge.	Date.	Hydrographer.	Gage height.	Dis-charge.
June 4	B. E. Jones.....	<i>Feet.</i> 1.61	<i>Sec.-ft.</i> 0.29	July 19	B. E. Jones.....	<i>Feet.</i> 2.66	<i>Sec.-ft.</i> 30.
11do.....	2.80	40.	Aug. 29do.....	2.09	10.6
11do.....	3.31	60.				

Daily gage height, in feet, and discharge, in second-feet, of Sun River canal near Sun River, Mont., for 1912.

[R. L. Lange, observer.]

Day.	June.		July.		August.		September.		October.		November.	
	Gage height.	Dis-charge	Gage height.	Dis-charge	Gage height.	Dis-charge	Gage height.	Dis-charge	Gage height.	Dis-charge	Gage height.	Dis-charge.
1.....	3.30	60.1	2.93	41.9	2.06	10.0	2.09	10.7	2.05	9.7
2.....	3.35	62.8	2.97	43.7	2.04	9.4	2.09	10.7	2.17	13.0
3.....	3.30	60.1	2.97	43.7	2.04	9.4	2.07	10.2	2.05	9.7
4.....	1.60	0.3	3.20	54.9	2.55	25.4	2.14	12.1	2.05	9.7	2.05	9.7
5.....	1.60	.3	3.20	54.9	2.55	25.4	2.14	12.1	2.05	9.7	9.6
6.....	1.60	.3	3.10	49.9	2.53	24.7	2.14	12.1	2.04	9.4	2.04	9.4
7.....	1.55	.2	3.10	49.9	2.53	24.7	2.14	12.1	2.04	9.4	2.04	9.4
8.....	1.55	.2	3.10	49.9	2.51	23.9	2.14	12.1	2.04	9.4	2.04	9.4
9.....	2.35	18.4	3.10	49.9	2.51	23.9	2.09	10.7	2.00	8.4	2.04	9.4
10.....	2.70	31.6	3.05	47.5	2.51	23.9	2.09	10.7	1.98	7.9
11.....	2.70	31.6	3.05	47.5	1.27	.0	2.04	9.4	1.94	7.0
12.....	2.60	27.4	3.00	45.1	1.25	.0	1.87	5.3	1.29	.0
13.....	3.15	52.4	3.05	47.5	2.58	26.6	1.84	4.7	1.24	.0
14.....	3.60	76.0	3.00	45.1	2.58	26.6	2.49	23.2	1.24	.0
15.....	3.15	52.4	3.00	45.1	2.67	30.3	2.49	23.2	2.01	8.7
16.....	3.05	47.5	3.00	45.1	2.64	29.1	2.47	22.4	1.98	7.9
17.....	3.30	60.1	2.97	43.7	2.64	29.1	2.44	21.4	2.04	9.4
18.....	3.50	70.7	2.97	43.7	2.64	29.1	3.70	31.4	2.04	9.4
19.....	3.50	70.7	2.56	25.8	2.47	22.4	1.39	.0	2.04	9.4
20.....	3.50	70.7	2.57	26.2	2.44	21.4	1.36	.0	1.99	8.2
21.....	3.50	70.7	2.57	26.2	2.44	21.4	2.27	15.9	1.99	8.2
22.....	3.50	70.7	2.57	26.2	2.42	20.7	2.29	16.5	1.97	7.7
23.....	3.50	70.7	26.2	2.39	19.7	2.29	16.5	1.39	.0
24.....	3.60	76.0	2.57	26.2	2.36	18.7	2.26	15.6	1.27	.0
25.....	3.50	70.7	2.57	26.2	2.36	18.7	2.26	15.6	1.27	.0
26.....	3.50	70.7	2.57	26.2	2.39	19.7	2.19	13.5	1.27	.0
27.....	3.45	68.0	2.58	26.6	2.39	19.7	2.14	12.1	1.24	.0
28.....	3.40	65.4	2.29	16.5	2.36	18.7	2.14	12.1	1.49	.0
29.....	3.40	65.4	2.77	34.7	2.08	10.5	2.16	12.7	1.49	.0
30.....	3.30	60.1	2.63	28.7	2.04	9.4	2.14	12.1	1.49	.0
31.....	2.63	28.7	2.06	10.0	2.05	9.7

NOTE.—Daily discharge determined from a well-defined rating curve. Discharge interpolated for days for which gage heights are missing.

Monthly discharge of Sun River canal near Sun River, Mont., for 1912.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accu- racy.
	Maximum.	Minimum.	Mean.		
June 4-30.....	76.0	0.2	48.1	2,580	A.
July.....	62.8	16.5	40.2	2,470	A.
August.....	43.7	0	22.7	1,400	A.
September.....	31.4	0	14.8	881	A.
October.....	10.7	0	5.84	359	A.
November 1-9.....	13.0	9.4	9.92	183	A.
The period.....	7,870

SUN RIVER CANAL AT VAUGHN, MONT.

Location.—In the SW. $\frac{1}{4}$ sec. 13, T. 21 N., R. 1 E., at Vaughn. The station is just above the point at which Sun River canal empties into Muddy Creek.

Records available.—July 1, 1912, to August 31, 1912.

Gage.—A vertical staff driven into the bed of the canal near the left bank.

Channel.—Permanent.

Discharge measurements.—Made by wading near the gage.

Winter flow.—None.

Diversions.—All water used is diverted above this station, the results here showing the amount of water wasted.

Accuracy.—Conditions for obtaining accurate discharge data are excellent. The results for 1912, however, are only fair, as there were not enough discharge measurements to accurately define a rating curve.

Discharge measurements of Sun River canal near Vaughn, Mont., in 1912.

Date.	Hydrographer.	Gage height.	Discharge.
July 22	B. E. Jones.....	<i>Feet.</i> 2.89	<i>Sec.-ft.</i> 15.4
Aug. 30do.....	2.25	1.30

Daily gage height, in feet, and discharge, in second-feet, of Sun River canal at Vaughn, Mont., for 1912.

[E. L. Moore, observer.]

Day.	July.		August.		Day.	July.		August.	
	Gage height.	Discharge.	Gage height.	Discharge.		Gage height.	Discharge.	Gage height.	Discharge.
1.....			2.15	0.4	16.....			2.9	15.8
2.....			2.0	.0	17.....			2.8	12.5
3.....			2.2	.8	18.....			2.95	17.6
4.....			2.1	.0	19.....			2.85	14.2
5.....			2.45	4.2	20.....			2.9	15.8
6.....			2.6	7.0	21.....	2.9	15.8	2.8	12.5
7.....			2.85	14.2	22.....	2.55	6.0	2.7	9.5
8.....			2.8	12.5	23.....	2.3	2.0	2.85	14.2
9.....			2.9	15.8	24.....	2.6	7.0	2.75	11.0
10.....			2.45	4.2	25.....	2.75	11.0	2.65	8.2
11.....			2.0	.0	26.....	2.8	12.5	2.7	9.5
12.....			2.1	.0	27.....	2.4	3.4	2.55	6.0
13.....			2.6	7.0	28.....	2.3	2.0	2.6	7.0
14.....			2.5	5.0	29.....	2.35	2.7	2.5	5.0
15.....			2.75	11.0	30.....	2.1	.0	2.4	3.4
					31.....	2.3	2.0	2.25	1.4

NOTE.—Daily discharge determined from a fairly well-defined rating curve.

Monthly discharge of Sun River canal near Vaughn, Mont., for 1912.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accu- racy.
	Maximum.	Minimum.	Mean.		
July.....	15.8	0	5.85	128	B.
August.....	17.6	0	7.93	488	B.

MARIAS RIVER BASIN.

MARIAS RIVER NEAR SHELBY, MONT.

Location.—In sec. 20, T. 31 N., R. 2 W., at the highway bridge near James A. Johnson's ranch, 7 miles south of Shelby, Mont.

Records available.—April 4, 1902, to June 30, 1906; March 21 to December 31, 1912.

Drainage area.—2,610 square miles.

Gages.—A standard chain gage fastened to the up-stream guardrail of the bridge was read during 1905-6; a Bristol automatic and a staff gage were set when the station was reestablished in 1911. The new gages are at practically the same datum as the old gage.

Channel.—Straight for 100 yards above and 200 yards below the station; right bank sandy, sloping, and liable to overflow; left bank high and protected by sheet piling and a plank wall. Bed composed of sand and gravel with some cobblestones. Liable to shift after freshets. Only one channel at all stages. Current is of moderate velocity and sets toward the left bank as it rounds a sharp curve some distance above.

Discharge measurements.—Made from highway bridge, lower chord of which is about 15 feet above low water.

Winter flow.—Affected by ice.

Cooperation.—Several measurements were furnished by the engineers of the Valier-Montana Land & Water Co.

Accuracy.—Results good.

Discharge measurements of Marias River near Shelby, Mont., in 1912.

Date.	Hydrographer.	Gage height.	Dis-charge.	Date.	Hydrographer.	Gage height.	Dis-charge.
		<i>Feet.</i>	<i>Sec.-ft.</i>			<i>Feet.</i>	<i>Sec.-ft.</i>
Mar. 24	W. A. Lamb.....	a 4.65	500	Aug. 31	R. O. Crawford.....	2.84	320
May 4	do.....	4.23	1,530	Sept. 17	do.....	3.09	481
July 13	C. S. Heidel.....	3.55	850	Nov. 15	T. R. Neiswander.....	3.69	920

a Ice present.

Daily gage height, in feet, of Marias River near Shelby, Mont., for 1912.

[Orin Hughes, observer.]

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1.....		4.2	4.5	5.4	4.2	3.3	2.8	3.25	3.0
2.....		4.3	4.45	5.3	4.2	3.3	2.85	3.35	4.35
3.....		4.35	4.4	5.3	4.2	3.4	2.9	3.3	4.35
4.....		4.4	4.3	5.2	4.1	3.5	3.0	3.25
5.....		4.4	4.3	5.1	4.0	3.25
6.....		4.2	4.2	5.1	3.8	3.2	3.25
7.....		4.2	4.8	3.8	3.3	3.25	3.2
8.....		3.8	4.5	4.7	3.8	3.1	3.45	3.2
9.....		4.0	5.5	4.8	3.8	3.05	3.0	3.2
10.....		4.2	5.3	5.0	3.7	3.15	3.2	3.3
11.....		4.6	4.4	4.9	3.6	3.15	3.2	3.7
12.....		5.0	4.5	4.9	3.6	3.1	3.1	3.6
13.....		4.8	4.3	4.8	3.5	3.1	3.2	3.55
14.....		4.4	4.3	4.9	3.5	3.2	3.55
15.....		4.2	5.3	4.9	3.5	3.1	3.15	3.7
16.....		4.25	5.8	4.7	3.5	3.15	3.1	3.15	3.55
17.....		4.3	5.9	4.5	3.5	3.2	3.1	3.2	3.45
18.....		4.35	5.9	4.4	3.5	3.3	3.1	3.2	3.45
19.....		4.4	6.0	4.2	3.4	3.2	3.1	3.4	3.5
20.....		4.35	5.9	4.2	3.5	3.1	3.3	3.35	3.45
21.....		4.3	7.0	4.2	3.6	3.1	3.2	3.35	3.35
22.....		4.3	8.0	4.2	3.8	3.1	3.2	3.4	3.3
23.....		4.3	7.6	4.2	3.6	3.0	3.3	3.4	3.3
24.....		4.3	6.9	4.1	2.9	3.4
25.....	5.0	4.4	6.4	4.1	3.6	2.9	3.35	3.4	3.35
26.....	5.3	4.4	7.0	4.1	3.5	2.9	3.2	3.4	3.3
27.....	5.4	4.4	6.0	4.0	3.5	2.9	3.35	3.0
28.....	6.0	4.4	6.0	4.0	3.3	3.4	3.15
29.....	5.0	4.4	6.0	4.0	3.3	2.8	3.4	3.4
30.....	4.3	4.5	5.7	4.0	3.2	2.8	3.3	3.3
31.....	4.0	5.5	3.2	2.85	3.3

NOTE.—Mar. 25-29 and Dec. 2-3, gage heights distorted by ice.

Daily discharge, in second-feet, of Marias River near Shelby, Mont., for 1912.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1.....		1,480	1,820	2,990	1,480	620	300	540	585	420
2.....		1,590	1,760	2,850	1,480	620	330	540	660	
3.....		1,640	1,700	2,850	1,480	700	360	540	620	
4.....		1,700	1,590	2,710	1,370	780	420	535	585	
5.....		1,700	1,590	2,580	1,260	730	485	535	585	
6.....		1,480	1,480	2,580	1,060	670	550	530	585	
7.....		1,270	1,480	2,190	1,060	620	585	530	550	
8.....		1,060	1,820	2,060	1,060	480	740	530	550	
9.....		1,260	3,130	2,190	1,060	450	420	525	550	
10.....		1,480	2,850	2,450	960	515	550	525	620	
11.....		1,940	1,700	2,320	870	515	550	520	960	
12.....		2,450	1,820	2,320	870	480	480	520	870	
13.....		2,190	1,590	2,190	780	480	550	520	825	
14.....		1,700	1,590	2,320	780	480	550	515	825	
15.....		1,480	2,850	2,320	780	480	515	515	960	
16.....		1,540	3,550	2,060	780	515	480	515	825	
17.....		1,590	3,690	1,820	780	550	480	550	740	
18.....		1,640	3,690	1,700	780	620	480	550	740	
19.....		1,700	3,830	1,480	700	550	480	700	780	
20.....		1,640	3,690	1,480	780	480	620	660	740	
21.....		1,590	5,230	1,480	870	480	550	660	660	
22.....		1,590	6,630	1,480	1,060	480	550	700	620	
23.....		1,590	6,070	1,480	870	420	620	700	620	
24.....		1,590	5,090	1,370	870	360	640	700	640	
25.....		1,700	4,390	1,370	870	360	660	700	660	
26.....		1,700	5,230	1,370	780	360	550	700	620	
27.....		1,700	3,830	1,260	780	360	550	660	420	
28.....		1,700	3,830	1,260	620	330	550	700	515	
29.....		1,700	3,830	1,260	620	300	545	700	700	
30.....	1,590	1,820	3,410	1,260	550	300	545	620	620	
31.....	1,260		3,130		550	330		620		

NOTE.—Daily discharge determined from a rating curve well defined below gage height 4.5 feet, and fairly well defined above 4.5 feet. Discharge interpolated for days for which gage heights are missing.

Monthly discharge of Marias River near Shelby, Mont., for 1912.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accu- racy.
	Maximum.	Minimum.	Mean.		
April.....	2,450	1,060	1,640	97,600	A.
May.....	6,630	1,480	3,160	194,000	B.
June.....	2,990	1,260	1,970	117,000	B.
July.....	1,480	550	923	56,800	A.
August.....	780	300	497	30,600	A.
September.....	740	300	523	31,100	A.
October.....	700	515	592	36,400	B.
November.....	960	420	674	40,100	A.
The period.....				604,000	

TWO MEDICINE RIVER AT FAMILY, MONT.

Location.—In the NE. $\frac{1}{4}$ NE. $\frac{1}{4}$ sec. 2, T. 31 N., R. 9 W., at the Holy Family Mission, 16 miles southeast of Browning, Mont., and about 6 miles above the mouth of Badger Creek, the nearest tributary.

Records available.—April, 1907, to December 31, 1912.

Drainage area.—368 square miles.

Gage.—Standard chain on the left bank of the stream directly back of the Mission buildings; datum of gage was lowered 0.95 foot on July 21, 1908.

Channel.—Gravel.

Discharge measurements.—Low-water measurements made by wading at section near the gage; high-water measurements must be made from the old wagon bridge about 3 miles above the mission.

Winter flow.—Affected by ice.

Divisions and storage.—Water is diverted at a point about 2 miles above the gage by a ditch which supplies water for about 100 acres of land on the farm at the Holy Family Mission. The United States Reclamation Service has under construction a project which will use about 200 second-feet of water for irrigating land north of the stream for the Blackfeet Indians. The water will be diverted near the mouth of Little Badger Creek, a small tributary entering from the south above the station. A storage reservoir will be built at Two Medicine Lake near the headwaters of the stream to augment the low-water flow.

Accuracy.—Results at this station are good except during the winter months.

Discharge measurements of Two Medicine River at Family, Mont., in 1912.

Date.	Hydrographer.	Gage height.	Discharge.
		<i>Feet.</i>	<i>Sec.-ft.</i>
Mar. 22	W. A. Lamb.....	a 1.57	62
July 5	R. R. Randall.....	2.46	442
Sept. 16	W. A. Lamb.....	1.83	151
Dec. 18do.....	1.75	105

a Ice present.

Daily gage height, in feet, and discharge, in second-feet, of Two Medicine River at Family, Mont., for 1912.

[J. J. Kittson, observer.]

Day.	April.		May.		June.		July.		October.	
	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
1.....	1.6	84	3.15	820	3.5	1,080	2.65	508	1.65	96
2.....	2.2	280	3.0	720	3.7	1,230	2.75	565	1.7	107
3.....	2.7	535	2.7	535	3.6	1,150	2.65	508	1.75	121
4.....	2.55	452	2.75	565	3.45	1,040	2.6	480	1.75	121
5.....	2.35	350	2.95	688	3.3	925	2.55	452	1.7	107
6.....	2.4	375	3.1	785	3.15	820	2.45	400	1.75	121
7.....	2.5	425	3.45	1,040	3.05	752	2.25	302	1.65	96
8.....	2.6	480	3.8	1,220	3.1	785	2.25	302	1.7	107
9.....	3.0	720	4.2	1,680	3.15	820	2.2	280	1.7	107
10.....	3.4	1,000	4.2	1,680	3.45	1,040	2.35	350	1.75	121
11.....	3.6	1,150	3.8	1,320	3.55	1,110	2.15	260	1.7	107
12.....	3.6	1,150	3.9	1,400	3.3	925	2.1	240	1.9	167
13.....	3.4	1,000	3.9	1,400	3.5	1,080	2.15	260	1.8	135
14.....	2.6	480	3.9	1,400	3.25	890	2.1	240
15.....	2.85	625	4.1	1,580	3.3	925	2.3	325
16.....	3.05	752	4.2	1,680	3.05	752	2.2	280
17.....	2.9	655	4.2	1,680	3.05	752	2.25	302
18.....	3.1	785	4.1	1,580	2.95	688
19.....	2.95	688	4.2	1,680	2.9	655
20.....	2.7	535	4.4	1,860	2.85	625
21.....	2.85	625	5.4	2,800	2.75	565
22.....	3.05	752	4.5	1,950	2.75	565
23.....	3.4	1,000	4.3	1,770	2.65	508
24.....	3.35	962	4.0	1,490	2.7	535
25.....	3.25	890	3.9	1,400	2.75	565
26.....	3.25	890	4.1	1,580	2.8	505
27.....	3.35	962	4.2	1,680	2.7	535
28.....	3.3	925	4.1	1,580	2.65	508
29.....	3.6	1,150	3.9	1,400	2.65	508
30.....	3.6	1,150	3.7	1,230	2.6	480
31.....	3.7	1,230

NOTE.—Daily discharge determined from a well defined rating curve. The accuracy was reduced on account of doubt as to correctness of observer's readings.

Monthly discharge of Two Medicine River at Family, Mont., for 1912.

[Drainage area, 368 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
April.....	1,150	84	728	1.98	2.21	43,300	B.
May.....	2,800	535	1,400	3.80	4.38	86,100	B.
June.....	1,230	480	780	2.12	2.36	46,400	B.
July 1-17.....	565	240	356	.967	.61	12,000	B.
October 1-13.....	167	96	116	.315	.15	2,990	B.

BADGER CREEK NEAR FAMILY, MONT.

Location.—In the NE. $\frac{1}{4}$ sec. 19, T. 31 N., R. 8 W., near the road crossing, 4 miles east of Family, Mont.

Records available.—April 20, 1907, to December 31, 1912.

Drainage area.—224 square miles.

Gage.—Chain. The original staff gage, established April 20, 1907, and bench marks were washed out in June, 1908, and a new gage was established July 22, 1908, about 400 feet farther upstream and at a different datum; as the bench mark was also destroyed the relation between the two gages could not be determined. The gage was again washed out on May 25, 1909, and was reset at a different datum and 400 feet below the old Piegan Mission crossing.

Channel.—Two channels at both medium and low stages; at high stages the stream flows in several channels.

Discharge measurements.—High-water measurements made from a cable, 4 miles above the gage; low-water measurements can be made by wading at the ford above the gage.

Diversions.—The United States Reclamation Service proposes to divert the natural flow of Badger Creek to irrigate land in the eastern part of the Blackfeet Indian Reservation north of Birch Creek.

Accuracy.—High-water measurements are only fair; low-water records are good.

Discharge measurements of Badger Creek near Family, Mont., in 1912.

Date.	Hydrographer.	Gage height.	Dis-charge.	Date.	Hydrographer.	Gage height.	Dis-charge.
		<i>Feet.</i>	<i>Sec.-ft.</i>			<i>Feet.</i>	<i>Sec.-ft.</i>
June 10	R. R. Randell.....	4.91	583	Sept. 16	W. A. Lamb.....	3.79	136
July 5do.....	4.30	273	Dec. 18do.....	^a 3.90	120
July 30	W. A. Lamb.....	4.00	184				

^a Ice present.

Daily gage height, in feet, of Badger Creek near Family, Mont., for 1912.

[O. J. Racine, observer.]

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1.....	4.0	4.45	4.9	4.5	4.0	4.8	3.75	3.85
2.....	4.0	4.4	4.9	4.5	4.0	4.75	3.8	3.85
3.....	4.0	4.4	4.9	4.45	4.0	3.8	3.8	3.8
4.....	4.05	4.4	4.9	-----	4.0	3.8	3.8	3.8
5.....	4.1	4.4	4.85	4.5	4.0	3.8	3.8	3.8
6.....	4.05	4.5	4.8	4.4	4.0	3.9	3.8	3.8
7.....	4.0	4.55	4.8	4.4	4.0	3.75	3.8	3.8
8.....	4.0	4.7	4.8	4.4	4.0	3.7	3.8	3.9
9.....	4.0	5.1	4.8	4.3	4.0	3.75	3.85	3.9
10.....	4.1	5.0	4.9	4.25	4.0	3.7	3.85	3.95
11.....	4.4	4.9	4.8	4.25	4.0	3.75	3.8	4.0
12.....	4.45	4.9	4.8	4.2	3.95	3.8	3.85	4.0
13.....	4.5	4.95	4.8	4.25	3.9	3.75	3.85	4.0
14.....	4.25	5.0	4.75	4.2	3.9	3.75	3.8	4.0
15.....	4.3	5.1	4.7	4.2	3.9	3.8	3.85	-----
16.....	4.2	5.2	4.6	4.2	3.9	3.8	3.9	-----
17.....	4.2	5.3	4.6	4.2	4.0	3.8	3.9	-----
18.....	4.2	5.3	4.6	4.2	4.0	3.8	3.9	-----
19.....	4.25	5.35	4.55	4.15	4.0	3.75	3.9	-----
20.....	4.3	5.4	4.5	4.2	3.95	3.75	3.9	-----
21.....	4.3	5.6	4.45	4.2	3.9	3.7	3.9	-----
22.....	4.35	5.4	4.45	4.2	3.9	3.75	3.9	-----
23.....	4.4	5.25	4.4	4.15	3.85	3.8	3.9	-----
24.....	4.4	5.2	4.4	4.1	3.8	3.75	3.9	-----
25.....	4.35	5.25	4.4	4.1	3.8	3.75	3.9	-----
26.....	4.3	5.2	4.4	4.1	3.7	3.7	3.9	-----
27.....	4.35	5.2	4.4	4.1	3.7	3.7	3.9	-----
28.....	4.4	5.15	4.45	4.0	3.7	3.7	3.9	-----
29.....	4.4	5.05	4.4	4.0	3.75	3.7	3.9	-----
30.....	4.5	5.0	4.5	4.0	3.8	3.75	3.9	-----
31.....	-----	5.0	-----	4.0	3.75	-----	3.8	-----

Daily discharge, in second-feet, of Badger Creek near Family, Mont., for 1912.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1.....	182	340	612	363	182	542	132	150
2.....	182	316	612	363	182	510	141	150
3.....	182	316	612	340	182	141	141	141
4.....	195	316	612	352	182	141	141	141
5.....	208	316	577	363	182	141	141	141
6.....	195	363	542	316	182	160	141	141
7.....	182	390	542	316	182	132	141	141
8.....	182	477	542	316	182	124	141	160
9.....	182	790	542	275	182	132	150	160
10.....	208	692	612	257	182	124	150	171
11.....	316	612	542	257	182	132	141	182
12.....	340	612	542	239	171	141	150	182
13.....	363	652	542	257	160	132	150	182
14.....	257	692	510	239	160	132	141	182
15.....	275	790	477	239	160	141	150	-----
16.....	239	890	417	239	160	141	160	-----
17.....	239	990	417	239	182	141	160	-----
18.....	239	990	417	239	182	141	160	-----
19.....	257	1,040	390	224	182	132	160	-----
20.....	275	1,100	363	239	171	132	160	-----
21.....	275	1,350	340	239	160	124	160	-----
22.....	296	1,100	340	239	160	132	160	-----
23.....	316	940	316	224	150	141	160	-----
24.....	316	890	316	208	141	132	160	-----
25.....	296	940	316	208	141	132	160	-----
26.....	275	890	316	208	124	124	160	-----
27.....	296	890	316	208	124	124	160	-----
28.....	316	840	340	182	124	124	160	-----
29.....	316	741	316	182	132	124	160	-----
30.....	363	692	363	182	141	132	160	-----
31.....	-----	692	-----	182	132	-----	141	-----

NOTE.—Daily discharge determined from a rating curve well defined below and fairly well defined above a discharge of 300 second-feet. Discharge interpolated July 4.

Monthly discharge of Badger Creek near Family, Mont., for 1912.

[Drainage area, 224 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
April.....	363	182	259	1.16	1.29	15,400	A.
May.....	1,350	316	731	3.26	3.76	44,900	B.
June.....	612	316	457	2.04	2.28	27,200	B.
July.....	363	182	256	1.14	1.31	15,700	A.
August.....	182	124	163	.728	.84	10,000	A.
September.....	542	124	160	.714	.80	9,520	A.
October.....	160	132	151	.674	.78	9,280	A.
November 1-14.....	182	141	159	.710	.37	4,420	A.
The period.....						136,000	

CUT BANK CREEK AT CUT BANK, MONT.

Location.—In the SW. $\frac{1}{4}$ SW. $\frac{1}{4}$ sec. 1, T. 33 N., R. 6 W., half a mile west of Cut Bank, at the Great Northern Railway bridge, 12 miles above the mouth of Two Medicine River.

Records available.—August 4, 1905, to December 31, 1912.

Drainage area.—971 square miles.

Gage.—Original gage was an overhanging chain gage on the left bank. On August 31, 1911, a staff gage was installed at a new section 200 yards farther upstream and has since been read.

Channel.—Gravel; shifts in flood.

Discharge measurements.—At high stages made from a cable 300 yards below the gage; low-stage measurements made by wading.

Winter flow.—Affected by ice.

Diversions.—The intake of the Great Northern Railway's pumping station is located 50 feet below the gage; the average quantity pumped is about 14,000 gallons an hour for 18 hours a day, equivalent to a continuous flow of 0.4 second-foot.

Accuracy.—Results as a whole are good.

Discharge measurements of Cut Bank Creek at Cut Bank, Mont., in 1912.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		<i>Feet.</i>	<i>Sec.-ft.</i>			<i>Feet.</i>	<i>Sec.-ft.</i>
Mar. 14	W. A. Lamb.....	5.35	18.7	July 6	R. R. Randell.....	4.71	231
May 3do.....	4.61	190	July 29	W. A. Lamb.....	4.46	138
June 12	R. R. Randell.....	5.08	444	Sept. 22do.....	4.28	89

^a Ice present.

Daily gage height, in feet, of Cut Bank Creek at Cut Bank, Mont., for 1912.

[Jessie Ferris, observer.]

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1.		4.9	4.6	5.1	4.95	4.42	4.15	4.30	4.25
2.		5.05	4.6	5.1	4.95	4.45	4.15	4.28	4.32
3.		5.15	4.6	5.1	4.95	4.52	4.15	4.25	4.30
4.		5.0	4.6	5.1	4.88	4.65	4.25	4.25	4.25
5.		5.05	4.6	5.0	4.82	4.6	4.3	4.25	4.2
6.		4.85	4.5	5.0	4.72	4.55	4.30	4.28	4.1
7.		4.6	4.6	5.0	4.70	4.5	4.32	4.30	4.15
8.		4.5	4.6	4.95	4.72	4.45	4.32	4.3	4.12
9.		4.4	4.6	4.95	4.75	4.4	4.30	4.3	4.45
10.		4.5	4.9	5.0	4.7	4.4	4.3	4.3	
11.		4.65	5.05	5.15	4.7	4.35	4.3	4.25	
12.		4.7	5.0	5.1	4.65	4.3	4.3	4.25	
13.		4.75	5.0	5.1	4.58	4.3	4.3	4.25	
14.		4.7	5.0	5.1	4.60	4.3	4.3	4.25	
15.		4.6	4.95	5.10	4.6	4.3	4.3	4.25	
16.		4.5	5.05	5.02	4.6	4.3	4.3	4.25	
17.		4.55	5.2	4.95	4.6	4.5	4.25	4.22	
18.		4.55	5.25	4.9	4.6	4.35	4.25	4.25	
19.		4.55	5.2	4.85	4.55	4.32	4.3	4.28	
20.		4.55	5.25	4.85	4.65	4.35	4.3	4.30	
21.		4.55	5.6	4.9	4.65	4.3	4.3	4.35	
22.		4.55	6.1	4.9	4.7	4.3	4.3	4.4	
23.		4.55	5.7	4.9	4.7	4.25	4.30	4.40	
24.		4.55	5.45	4.9	4.70	4.2	4.32	4.38	
25.	7.0	4.55	5.3	4.9	4.62	4.2	4.35	4.32	
26.	7.1	4.55	5.3	4.9	4.55	4.2	4.35	4.30	
27.	7.0	4.55	5.35	4.85	4.5	4.2	4.32	4.3	
28.	7.8	4.55	5.45	4.8	4.45	4.2	4.30	4.3	
29.	5.1	4.6	5.35	4.80	4.42	4.15	4.3	4.30	
30.	5.0	4.6	5.2	4.88	4.40	4.15	4.3	4.32	
31.	4.9		5.1		4.42	4.15		4.25	

NOTE.—Relation of gage height to discharge, Mar. 25-28 and Nov. 9 affected by ice.

Daily discharge, in second-feet, of Cut Bank Creek at Cut Bank, Mont., for 1912.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1.		330	190	460	360	125	58	90	78
2.		425	190	460	360	135	58	85	96
3.		500	190	460	360	160	58	78	90
4.		390	190	460	319	210	78	78	78
5.		425	190	390	286	190	90	78	67
6.		302	152	390	239	171	90	85	48
7.		190	190	390	230	152	96	90	58
8.		152	190	360	239	135	96	90	52
9.		118	190	360	252	118	90	90	50
10.		152	330	390	230	118	90	90	50
11.		210	425	500	230	104	90	78	
12.		230	390	460	210	90	90	78	
13.		252	390	460	182	90	90	78	
14.		230	390	460	190	90	90	78	
15.		190	360	460	190	90	90	78	
16.		152	425	404	190	90	90	78	
17.		171	540	360	190	152	78	72	
18.		171	585	330	190	104	78	78	
19.		171	540	302	171	96	90	85	
20.		171	585	302	210	104	90	90	
21.		171	940	330	210	90	90	104	
22.		171	1,640	330	230	90	90	118	
23.		171	1,060	330	230	78	90	118	
24.		171	770	330	230	67	96	112	
25.	400	171	630	330	198	67	104	96	
26.	400	171	630	330	171	67	104	90	
27.	400	171	675	302	152	67	96	90	
28.	400	171	770	275	135	67	90	90	
29.	460	190	675	275	125	58	90	90	
30.	390	190	540	319	90	58	90	96	
31.	330		460		125	58		78	

NOTE.—Daily discharge determined from a rating curve well defined below discharge of 500 second-feet. Discharge estimated as follows: Mar. 1-24, 20 second-feet; Mar. 25-28, 400 second-feet; Nov. 9-10, 50 second-feet.

Monthly discharge of Cut Bank Creek at Cut Bank, Mont., for 1912:

[Drainage area, 971 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
March.....			105	0.108	0.12	6,460	D.
April.....	500	118	223	.230	.26	13,300	A.
May.....	1,640	152	497	.512	.59	30,600	B.
June.....	500	275	377	.388	.43	22,400	A.
July.....	360	90	217	.223	.26	13,300	A.
August.....	210	58	106	.109	.13	6,520	A.
September.....	104	58	87.3	.090	.10	5,190	A.
October.....	118	72	88.0	.091	.10	5,410	A.
November 1-10.....	96		66.7	.069	.03	1,320	B.
The period.....						104,000	

BIRCH CREEK NEAR DUPUYER, MONT.

Location.—In sec. 28, T. 29 N., R. 8 W., at Shield's ranch, 12 miles northwest of Dupuyer, Mont., and about 25 miles above the junction of Birch Creek with Two Medicine River.

Records available.—July 25, 1907, to December 31, 1912.

Drainage area.—155 square miles.

Gage.—A temporary staff gage was put in July 23, 1908, about 200 feet below the site of the original gage, which had been washed out by the high water of June, 1908. The temporary gage was used until October 1, 1908, when a permanent chain gage was installed at a point about one-fourth mile farther upstream. A Bristol automatic gage was installed April 1, 1911, but the chain gage is still read daily.

Channel.—Shifts at high stages.

Discharge measurements.—Made from a car and cable three-fourths mile below the gage. At low stages measurements are made by wading just below the cable section.

Winter flow.—Affected by ice.

Diversions.—A number of ditches divert water for irrigation. The largest of these, owned by the Conrad Investment Co., diverts water about half a mile below the station.

Cooperation.—Gage heights and discharge measurements were furnished by the engineers of the Valier-Montana Land & Water Co.

Accuracy.—Owing to frequency of measurement during 1912 the results are considered good.

Discharge measurements of Birch Creek near Dupuyer, Mont., in 1912.

Date.	Hydrographer.	Gage height.	Dis-charge.	Date.	Hydrographer.	Gage height.	Dis-charge.
		<i>Feet.</i>	<i>Sec.-ft.</i>			<i>Feet.</i>	<i>Sec.-ft.</i>
Feb. 3	R. M. Templeton.....	a 5.75	84	July 12	R. O. Crawford.....	5.00	198
Mar. 27	R. O. Crawford.....	a 5.9	21	30	do.....	4.81	146
Apr. 8	do.....	4.57	148	Aug. 7	do.....	4.73	129
15	do.....	4.77	188	21	do.....	4.66	127
29	do.....	5.02	247	Sept. 12	do.....	4.51	105
May 6	do.....	4.93	198	25	do.....	4.51	102
13	do.....	5.48	344	Oct. 9	do.....	4.52	101
28	do.....	6.26	588	25	T. R. Neiswander.....	4.54	102
June 4	do.....	5.88	456	Nov. 5	do.....	4.47	96
11	do.....	5.87	470	13	do.....	4.59	110
25	do.....	5.42	317	19	do.....	4.56	110
July 2	do.....	5.43	270	26	do.....	a 4.55	76
9	do.....	5.12	206	Dec. 3	do.....	a 4.62	89
12	do.....	5.00	195	10	do.....	a 4.51	75

a Ice present.

NOTE.—Gage heights were observed on the chain gage.

Daily gage height, in feet, of Birch Creek near Dupuyer, Mont., for 1912.

[L. G. Kepple, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1.	5.5	6.5	5.6	4.4	4.95	6.0	5.3	4.75	4.55	4.45	4.45	4.5
2.	5.55	6.8	5.2	4.55	4.95	6.0	5.4	4.8	4.55	4.45	4.45	4.55
3.	5.55	6.8	4.95	4.5	4.95	5.95	5.25	4.8	4.55	4.45	4.45	4.5
4.		6.5	4.7	4.55	4.95	5.9	5.2	4.8	4.6	4.5	4.45	4.5
5.		6.0	4.65	4.55	4.95	5.75	5.15	4.75	4.55	4.5	4.45	4.5
6.		5.85	6.1	4.55	4.9	5.7	5.15	4.75	4.55	4.5	4.5	4.25
7.		5.7	5.6	4.5	4.9	5.7	5.1	4.7	4.55	4.5	4.5	4.25
8.		5.65	5.85	4.6	5.45	5.65	5.15	4.7	4.55	4.5	4.65	4.5
9.		5.7	5.4	4.7	5.55	5.85	5.1	4.7	4.5	4.5	4.65	4.45
10.		5.7	5.45	4.85	5.55	5.9	5.1	4.7	4.5	4.5	4.65	4.5
11.		5.85	5.3	4.95	5.5	5.85	5.1	4.65	4.5	4.5	4.6	4.55
12.		5.85	5.85	4.95	5.5	5.85	4.95	4.65	4.5	4.5	4.55	4.55
13.	5.2	5.85	5.85	4.85	5.5	5.85	4.95	4.6	4.5	4.5	4.6	4.5
14.	5.8	5.85	5.2	4.8	5.55	5.65	5.0	4.6	4.5	4.5	4.55	4.5
15.	6.4	5.7	5.65	4.75	5.7	5.6	4.9	4.6	4.5	4.55	4.55	4.5
16.	6.6	5.55	5.45	4.75	5.9	5.6	4.95	4.6	4.5	4.55	4.55	4.5
17.	6.7	5.4	5.8	4.75	5.9	5.5	4.9	4.6	4.5	4.55	4.55	4.5
18.	6.6	5.35	5.65	4.8	5.85	5.5	4.9	4.6	4.5	4.55	4.5	4.5
19.	6.7	5.35	5.35	4.85	5.8	5.45	4.9	4.65	4.55	4.6	4.55	4.5
20.	6.6	5.35	5.15	4.85	6.5	5.45	4.95	4.65	4.5	4.55	4.55	4.5
21.	6.6	5.4	5.25	4.9	7.0	5.45	4.95	4.65	4.45	4.55	4.5	4.5
22.	6.6	5.25	5.7	4.9	6.9	5.45	4.9	4.6	4.45	4.55	4.55	4.5
23.	6.5	5.7	5.6	4.95	6.6	5.5	4.9	4.55	4.45	4.55	4.5	4.5
24.	6.4	5.3	5.45	5.0	6.3	5.45	4.9	4.55	4.5	4.55	4.55	4.5
25.	6.2	6.0	5.85	4.95	6.3	5.4	4.85	4.55	4.5	4.55	4.55	5.25
26.	6.2	5.95	6.1	4.95	6.4	5.35	4.8	4.55	4.5	4.55	4.55	5.7
27.	6.2	5.55	6.2	4.95	6.4	5.35	4.8	4.55	4.5	4.55	4.55	5.75
28.	6.0	5.85	5.85	4.95	6.4	5.35	4.8	4.55	4.5	4.55	4.55	5.75
29.	6.0	5.7	4.3	5.0	6.3	5.35	4.75	4.55	4.45	4.55	4.5	5.7
30.	5.95		4.3	5.0	6.0	5.35	4.75	4.55	4.45	4.5	4.5	5.7
31.	5.95		4.25		6.0		4.75	4.55		4.45		5.65

NOTE.—The record obtained from the Bristol automatic gage was more or less unsatisfactory on account of the well silting up. The daily gage heights are based largely upon the daily readings of the chain gage. The relation of gage height to discharge was affected by ice Jan. 1 to Mar. 31 and Nov. 24 to Dec. 31. Jan. 4–12 the stream was frozen solid at the gage.

Daily discharge, in second-feet, of Birch Creek near Dupuyer, Mont., for 1912.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1.	122	220	505	260	136	108	97	97
2.	145	218	505	281	144	108	97	97
3.	137	215	489	242	144	108	97	97
4.	145	212	473	230	144	114	102	97
5.	145	208	425	218	136	108	102	97
6.	145	188	409	218	136	108	102	102
7.	137	188	409	207	128	108	102	102
8.	153	333	394	218	128	108	102	121
9.	173	363	457	207	128	102	102	121
10.	206	363	473	207	128	102	102	121
11.	230	348	457	207	121	102	102	114
12.	230	348	457	174	121	102	102	108
13.	206	348	457	174	114	102	102	114
14.	195	363	394	185	114	102	102	108
15.	184	409	378	163	114	102	108	108
16.	184	473	378	174	114	102	108	108
17.	184	473	348	163	114	102	108	108
18.	195	457	348	163	114	102	108	102
19.	206	441	333	163	121	108	114	108
20.	206	668	333	174	121	102	108	108
21.	218	842	333	174	121	97	108	102
22.	218	807	333	163	114	97	108	108
23.	230	702	348	163	108	97	108	102
24.	243	602	333	163	108	102	108	94
25.	230	602	318	154	108	102	108	85
26.	230	635	300	144	108	102	108	76
27.	230	635	293	144	108	102	108	78
28.	230	635	288	144	108	102	108	80
29.	243	602	283	136	108	97	108	82
30.	238	505	278	136	108	97	102	84
31.		505		136	108		97	

NOTE.—Daily discharge determined as follows: Apr. 1–29 and May 6 to June 25 from two well-defined rating curves, and July 2 to Nov. 23 from a rating curve fairly well defined above, and well defined below 200 second-feet. Shifting-channel methods were used Apr. 30 to May 5 and June 26 to July 1. Daily discharge estimated Nov. 24–30.

Monthly discharge of Birch Creek near Dupuyer, Mont., for 1912.

[Drainage area, 186 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
January.....			α 40	0.215	0.25	2,480	D.
February.....			α 60	.323	.35	3,450	D.
March.....			α 40	.215	.25	2,480	D.
April.....	243	122	195	1.05	1.17	11,600	A.
May.....	842	188	449	2.41	2.78	27,600	A.
June.....	505	278	384	2.06	2.30	22,800	A.
July.....	281	136	183	.984	1.13	11,300	B.
August.....	144	108	120	.645	.74	7,380	A.
September.....	114	97	103	.554	.62	6,130	A.
October.....	114	97	104	.559	.64	6,400	A.
November.....	121	76	101	.543	.61	6,010	A.
December.....			α 65	.349	.40	4,000	C.
The year.....	842		154	.828	11.24	112,000	

α Estimated.

NOTE.—The above drainage area was determined by the engineers of the Valier Carey Project, and supersedes the value 155 previously used.

DUPUYER CREEK AT DUPUYER, MONT.

Location.—In SW. $\frac{1}{4}$ SW. $\frac{1}{4}$ sec. 10, T. 28 N., R. 7 W., at the highway bridge in the town of Dupuyer, Mont.

Records available.—April 15, 1908, to December 31, 1912.

Drainage area.—Not measured.

Gage.—The original staff gage was nailed to the cribbing under the east end of the highway bridge. The gage was washed out July 28, 1909, and was replaced September 20, 1909, gage readings being reduced to the original datum. In the spring of 1909 a breakwater was constructed on the left (west) bank which deflected the water to the opposite side. A new gage was installed April 25, 1910, at the same site as the original datum, but owing to changes in the channel the gage records for 1910-1912 are not directly comparable with those for earlier years.

Channel.—Shifts at high stages.

Discharge measurements.—Made from downstream side of highway bridge at high stages; low-stage measurements are made by wading.

Winter flow.—Affected by ice.

Accuracy.—Frequent measurements are necessary at this station to insure good results as conditions in the channel are unfavorable but results for 1912 are considered good.

Cooperation.—Gage heights and discharge measurements were furnished by the engineers of the Valier-Montana Land & Water Co.

Discharge measurements of Dupuyer Creek at Dupuyer, Mont. for 1912.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		<i>Feet.</i>	<i>Sec.-ft.</i>			<i>Feet.</i>	<i>Sec.-ft.</i>
Feb. 2	R. M. Templeton.....	α 2.5	30	Aug. 7	R. O. Crawford.....	1.31	37
Mar. 27	R. O. Crawford.....	α 3.18	59	Aug. 20	do.....	1.32	38
Apr. 9	do.....	1.38	68	Sept. 10	do.....	1.22	23
Apr. 30	do.....	1.40	68	Sept. 24	do.....	1.26	29
May 6	do.....	1.35	60	Oct. 10	do.....	1.24	25
May 13	do.....	1.43	71	Oct. 25	T. R. Neiswander.....	1.25	25
May 28	do.....	2.15	278	Nov. 4	do.....	1.25	25
June 4	do.....	1.80	160	Nov. 12	do.....	1.24	25
June 10	do.....	1.70	124	Nov. 18	do.....	1.22	24
June 24	do.....	1.48	63	Nov. 25	do.....	α 1.22	23
July 1	do.....	1.54	81	Dec. 2	do.....	α 1.59	19.9
July 8	do.....	1.43	57	Dec. 9	do.....	α 1.68	25
July 12	do.....	1.43	57				

α Ice present.

Daily gage height, in feet, of Dupuyer Creek at Dupuyer, Mont., for 1912.

[John Pfeiffer, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1.....	2.1	2.5	1.4	2.1	1.4	2.1	1.55	1.3	1.2	1.2	1.25	1.48
2.....	2.1	2.5	1.4	2.0	1.4	1.9	1.55	1.3	1.2	1.2	1.25	1.59
3.....	2.1	2.5	1.4	1.7	1.3	1.8	1.54	1.3	1.2	1.2	1.25	1.56
4.....	2.1	2.6	1.2	1.6	1.3	1.8	1.53	1.3	1.2	1.2	1.23	1.56
5.....	2.1	2.6	1.4	1.5	1.3	1.8	1.5	1.3	1.3	1.2	1.23	1.56
6.....	2.2	2.6	1.4	1.4	1.4	1.7	1.48	1.3	1.3	1.2	1.23	1.56
7.....	2.4	2.4	1.5	1.3	1.4	1.7	1.45	1.3	1.2	1.2	1.23	1.57
8.....	2.6	2.4	1.4	1.3	1.4	1.7	1.4	1.3	1.2	1.2	1.23	1.57
9.....	2.6	2.4	1.4	1.4	1.4	1.7	1.4	1.29	1.2	1.26	1.2	1.57
10.....	2.8	2.4	1.4	1.4	1.4	1.7	1.4	1.29	1.2	1.26	1.2	1.57
11.....	2.8	2.5	1.5	1.4	1.4	1.7	1.4	1.3	1.2	1.25	1.2	1.57
12.....	2.8	2.3	1.5	1.3	1.4	1.7	1.4	1.3	1.2	1.25	1.2	1.58
13.....	2.8	2.5	1.5	1.3	1.4	1.6	1.4	1.3	1.2	1.25	1.2	1.59
14.....	2.8	2.5	1.5	1.4	1.4	1.6	1.4	1.3	1.2	1.25	1.2	1.69
15.....	2.8	2.4	1.5	1.4	1.4	1.6	1.4	1.3	1.2	1.25	1.2	2.0
16.....	2.8	2.6	1.6	1.4	1.4	1.6	1.4	1.3	1.2	1.25	1.2	2.15
17.....	2.8	2.5	1.7	1.5	1.4	1.5	1.4	1.34	1.2	1.25	1.2	2.9
18.....	2.8	2.5	1.7	1.5	1.4	1.5	1.4	1.35	1.2	1.25	1.2	2.8
19.....	2.8	2.5	1.7	1.5	1.4	1.5	1.4	1.35	1.2	1.25	1.2	2.0
20.....	2.8	2.5	1.8	1.4	2.1	1.5	1.4	1.32	1.2	1.25	1.2	1.58
21.....	2.8	2.4	1.8	1.4	2.7	1.4	1.4	1.3	1.2	1.25	1.2	1.59
22.....	2.8	2.4	1.8	1.4	2.6	1.4	1.4	1.25	1.2	1.25	1.2	2.0
23.....	2.9	2.4	1.8	1.4	2.6	1.4	1.4	1.25	1.25	1.25	1.2	2.1
24.....	2.8	2.4	1.9	1.4	2.5	1.48	1.4	1.25	1.25	1.25	1.2	2.1
25.....	2.6	2.2	1.9	1.4	2.5	1.48	1.4	1.25	1.21	1.26	1.48	2.1
26.....	2.4	2.0	1.9	1.4	2.5	1.48	1.3	1.2	1.2	1.26	1.48	2.1
27.....	2.4	2.0	2.0	1.4	2.5	1.5	1.3	1.2	1.2	1.26	1.47	2.3
28.....	2.5	2.0	2.0	1.4	2.4	1.5	1.3	1.2	1.2	1.26	1.47	2.3
29.....	2.5	2.0	2.1	1.4	2.3	1.5	1.3	1.2	1.2	1.26	1.46	2.0
30.....	2.5	2.1	1.4	2.3	1.5	1.3	1.2	1.2	1.25	1.47	2.1
31.....	2.5	2.1	2.2	1.3	1.2	1.25	2.1

NOTE.—The records obtained from the Bristol automatic gage were more or less unsatisfactory and all readings have been based on the daily readings of the staff gage. Relation of gage height to discharge affected by ice Jan. 1 to Apr. 5 and Nov. 25 to Dec. 31.

Daily discharge, in second-feet, of Dupuyer Creek at Dupuyer, Mont., for 1912.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1.....	63	68	259	84	34	20	20	27
2.....	64	68	188	84	34	20	20	27
3.....	65	54	155	82	34	20	20	27
4.....	66	54	155	79	34	20	20	24
5.....	67	54	155	72	34	34	20	24
6.....	68	68	124	68	34	34	20	24
7.....	54	68	124	62	34	20	20	24
8.....	54	68	124	51	34	20	20	24
9.....	68	68	124	51	33	20	28	20
10.....	68	68	124	51	33	20	28	20
11.....	68	68	124	51	34	20	27	20
12.....	54	68	124	51	34	20	27	20
13.....	54	68	96	51	34	20	27	20
14.....	68	68	96	51	34	20	27	20
15.....	68	68	96	51	34	20	27	20
16.....	68	68	96	51	34	20	27	20
17.....	86	68	72	51	41	20	27	20
18.....	86	68	72	51	42	20	27	20
19.....	86	68	72	51	42	20	27	20
20.....	68	270	72	51	37	20	27	20
21.....	68	512	51	51	34	20	27	20
22.....	68	466	51	51	27	20	27	20
23.....	68	466	51	51	27	27	27	20
24.....	68	421	68	51	27	27	27	20
25.....	68	421	68	51	27	21	28	23
26.....	68	421	68	34	20	20	28	23
27.....	68	421	72	34	20	20	28	22
28.....	68	378	72	34	20	20	28	22
29.....	68	337	72	34	20	20	28	22
30.....	68	337	72	34	20	20	27	21
31.....	297	34	20	27

NOTE.—Daily discharge Apr. 6 to May 20 determined from a fairly well defined rating curve, and May 21 to Nov. 24 from a rating curve well defined for discharge above and fairly well defined for discharge below 40 second-feet. Daily discharge estimated Apr. 1-5 and Nov. 25-30.

Monthly discharge of Dupuyer Creek at Dupuyer, Mont., for 1912.

[Drainage area, 54 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
January.....			α 20	0.370	0.43	1,230	D.
February.....			α 35	.648	.70	2,010	D.
March.....			α 25	.461	.53	1,540	D.
April.....	86	54	67.4	1.25	1.40	4,010	B.
May.....	512	54	193	3.57	4.12	11,900	B.
June.....	259	51	103	1.91	2.13	6,130	A.
July.....	84	34	53.3	.987	1.14	3,280	A.
August.....	42	20	31.2	.578	.67	1,920	B.
September.....	34	20	21.4	.396	.44	1,270	B.
October.....	28	20	25.4	.470	.54	1,560	B.
November.....	27	20	21.8	.404	.45	1,300	B.
December.....			α 20	.370	.43	1,230	D.
The year.....	512		51.5	.954	12.98	37,400	

 α Estimated.

DUPUYER CREEK NEAR VALIER, MONT.

Location.—In NE. $\frac{1}{4}$ NW. $\frac{1}{4}$ sec. 33, T. 29 N., R. 6 W., about 11 miles northwest of Valier. It is about 1,000 feet above a large diversion dam at the head of the canal from Dupuyer Creek to Lake Francis reservoir. The Birch Creek canal enters Dupuyer Creek below the gaging station and above the diversion dam.

Records available.—July 17 to December 31, 1912.

Drainage area.—Not measured.

Gage.—A standard chain gage and a Bristol automatic at the same section.

Channel.—Shifts slightly.

Discharge measurements.—Made from a cable at high stages and by wading at medium and low stages.

Winter flow.—Affected by ice.

Diversions.—There are numerous water appropriations recorded, but many of the rights have never been used.

Accuracy.—Conditions for obtaining accurate discharge data are good.

Cooperation.—Gage heights and most of the discharge measurements were furnished by the engineers of the Valier-Montana Land & Water Co.

Discharge measurements of Dupuyer Creek near Valier, Mont., in 1912.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		<i>Feet.</i>	<i>Sec.-ft.</i>			<i>Feet.</i>	<i>Sec.-ft.</i>
July 17	C. S. Heidel.....	2.87	61	Nov. 4	T. R. Neiswander	2.64	34
26	R. O. Crawford.....	2.87	55	12	do.....	2.68	36
29	do.....	2.79	45	18	do.....	2.69	34
Aug. 15	do.....	2.68	36	25	do.....	α 2.72	33
22	do.....	2.70	35	Dec. 2	do.....	α 2.93	27
Oct. 26	T. R. Neiswander.....	2.64	28	9	do.....	α 3.00	31

 α Ice present.

Daily gage height, in feet, and discharge, in second-feet, of Dupuyer Creek near Valier, Mont., for 1912.

[C. E. Crocker, observer.]

Day.	July.		August.		September.		October.		November.		December.	
	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
1					2.62	28	2.60	26	2.76	43	2.73	
2					2.62	28	2.59	25	2.70	36	2.87	
3					2.63	29	2.58	24	2.70	36		
4					2.71	37	2.67	33	2.68	34	2.91	
5					2.72	38	2.66	32	2.67	33	2.88	
6					2.70	36	2.66	32	2.69	35	3.00	
7					2.67	33	2.65	31	2.73	40	2.97	
8					2.67	33	2.62	28	2.76	43	2.99	
9					2.64	30	2.67	33	2.68	34	2.99	
10					2.63	29	2.67	33	2.73	40	3.00	
11					2.62	28	2.65	31	2.71	37	2.80	
12					2.59	25	2.72	38	2.71	37	3.02	
13					2.61	27	2.71	37	2.78	46	3.07	
14					2.61	27	2.68	34	2.68	34	3.07	
15			2.68	34	2.61	27	2.66	32	2.79	47	3.92	
16			2.73	40	2.60	26		34		45	3.01	
17	2.87	58	2.73	40	2.58	24	2.69	35	2.76	43		
18		58	2.70	36	2.57	24	2.69	35	2.70	36	3.53	
19		58	2.88	59	2.63	29	2.66	32	2.72	38	3.51	
20		58	2.87	58	2.62	28	2.65	31	2.74	41		
21		58	2.78	46	2.63	29		28	2.71	37	3.22	
22		58	2.71	37	2.65	31	2.60	26		34	3.32	
23		58	2.66	32	2.69	35	2.64	30	2.65	31	3.33	
24		58	2.63	29	2.70	36	2.74	41	2.69	35		
25		58	2.61	27	2.68	34		36		33	3.39	
26	2.87	58	2.64	30	2.67	33	2.64	30	2.59	32	3.34	
27		47	2.64	30	2.65	31	2.63	29	2.74	31	3.30	
28		47	2.64	30	2.63	29	2.65	31	2.78	30		
29	2.79	47	2.63	29	2.63	29	2.69	35	2.88	28	3.44	
30		47	2.62	28	2.61	27	2.76	43	2.89	29	3.46	
31		47	2.62	28			2.79	47			3.41	

NOTE.—The Bristol automatic gage at this station was not in continuous operation during 1912. All gage heights have been corrected to the datum of the staff gage. Relation of gage height to discharge affected by ice Nov. 26 to Dec. 31.

Daily discharge determined from a well-defined rating curve. Daily discharge estimated Nov. 26-30. Discharge interpolated for days for which gage heights are missing.

Monthly discharge of Dupuyer Creek near Valier, Mont., for 1912.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accu- racy.
	Maximum.	Minimum.	Mean.		
July 17-31	58	47	54.3	1,620	B.
August 15-31	59	27	36.1	1,220	A.
September	38	24	30.0	1,790	A.
October	47	24	32.6	2,000	A.
November	47	28	36.6	2,180	B.
December			30.0	1,840	D.
The period				10,600	

^a Estimated.

DRY FORK OF MARIAS RIVER NEAR VALIER, MONT.

Location.—In the SW. $\frac{1}{4}$ sec. 36, T. 29 N., R. 5 W., about 9 miles southeast of Valier and 5 miles south of the dam of the Lake Francis Reservoir.

Records available.—March 19, 1911, to December 31, 1912.

Drainage area.—About 120 square miles.

Gages.—Bristol automatic and an inclined staff gage on the left bank. The Bristol gage has a range of 8 feet.

Channel.—Shifting; bed of stream composed of sand and gravel.

Discharge measurements.—At low and medium stages made by wading; during high stages it may be necessary to use floats.

Winter flow.—Affected by ice.

Diversions.—Appropriations amounting to nearly 1,200 second-feet have been filed on Dry Fork and its branches.

Cooperation.—Gage heights and discharge measurements were furnished by the engineers of the Valier-Montana Land & Water Co.

Discharge measurements of Dry Fork of Marias River near Valier, Mont., in 1912.

Date.	Hydrographer.	Gage height.	Dis-charge.	Date.	Hydrographer.	Gage height.	Dis-charge.
		<i>Feet.</i>	<i>Sec.-ft.</i>				<i>Sec.-ft.</i>
Jan. 13	R. M. Templeton.....	a 2.1	0	July 8	R. O. Crawford	1.97	4.6
Feb. 1do.....	a 3.4	24	12do.....	1.92	4.7
Mar. 26	R. O. Crawford.....	b 5.5	242	Aug. 7do.....	1.90	3.6
29do.....	c 3.5	205	20do.....	1.76	1.7
Apr. 10do.....	2.3	22	Sept. 6do.....	1.70	1.3
May 1do.....	1.89	13.1	Oct. 11do.....	2.20	20
8do.....	1.80	10.0	24	T. R. Neiswander.....	1.97	4.3
14do.....	1.70	4.2	Nov. 4do.....	2.03	8.7
22do.....	d 3.33	259	12do.....	2.04	9.4
27do.....	2.63	61	18do.....	2.00	6.5
June 3do.....	2.15	16.2	25do.....	a 1.92	2.9
10do.....	2.12	14.9	Dec. 2do.....	a 1.87	2.2
24do.....	1.77	2.2	9do.....	a 1.89	2.4
July 1do.....	1.88	2.7				

a Ice present.

b Ice jam below gage.

c Ice gone.

d Staff gage washed out. Staff probably equals Bristol gage plus 1.5 or 1.83+1.5=3.33. Measured under difficulties and accuracy questionable.

Daily gage height, in feet, of Dry Fork of Marias River near Valier, Mont., for 1912.

[W. R. Hunt, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1.....	2.2	3.4	2.5	2.8	1.9	2.25	1.9	1.7	1.55	1.95	2.05	1.95
2.....	2.2	3.3	2.5	3.0	1.8	2.2	2.2	1.7	1.55	1.95	2.05	1.9
3.....	2.2	3.3	2.5	3.0	1.8	2.15	2.2	1.75	1.55	1.95	2.05	1.9
4.....	2.2	3.3	2.45	2.9	1.8	2.1	2.2	1.85	1.75	1.95	2.05	1.85
5.....	2.1	3.3	2.4	2.6	1.85	2.0	2.1	1.9	1.75	1.95	2.0	1.9
6.....	2.1	3.2	2.4	2.5	1.85	2.0	2.05	2.0	1.8	1.95	2.0	1.9
7.....	2.1	3.2	2.35	2.5	1.8	2.1	2.05	1.9	1.95	2.0	2.0	1.9
8.....	2.1	3.15	2.3	2.4	1.8	2.15	1.95	1.8	1.95	1.9	2.0	1.9
9.....	2.1	3.1	2.3	2.3	1.75	2.1	1.9	1.8	1.85	1.9	2.1	1.9
10.....	2.1	3.1	2.3	2.3	1.75	2.1	1.9	1.7	1.8	1.9	2.1	1.9
11.....	2.1	3.1	2.3	2.3	1.75	2.0	1.9	1.65	1.8	2.2	2.1	2.0
12.....	2.1	3.1	2.3	2.2	1.65	2.0	1.85	1.6	1.8	2.3	2.05	1.95
13.....	2.1	3.0	2.3	2.2	1.65	2.0	1.85	1.6	1.75	2.25	2.0	1.95
14.....	2.1	3.1	2.3	2.3	1.7	1.95	1.85	1.55	1.75	2.15	2.0	2.0
15.....	2.1	3.1	2.35	2.3	1.7	1.9	1.9	1.55	1.7	2.1	1.95	2.05

Daily gage height, in feet, of Dry Fork of Marias River near Valier, Mont., for 1912—
Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
16.....	2.2	3.15	2.4	2.4	1.7	1.9	1.8	1.6	1.7	2.05	2.0	2.0
17.....	2.1	3.2	2.4	2.3	1.65	1.85	1.8	1.55	1.65	2.0	2.0	1.9
18.....	2.1	3.1	2.4	2.3	1.65	1.85	1.85	1.6	1.6	1.95	2.0	1.95
19.....	2.1	3.05	2.4	2.8	1.65	1.8	1.95	1.85	1.8	2.0	2.0	1.85
20.....	2.1	3.0	2.4	2.9	1.7	1.8	1.9	1.75	1.9	1.95	2.0	1.8
21.....	2.1	3.0	2.45	2.6	5.2	1.85	1.95	1.95	1.95	1.95	1.95	1.8
22.....	2.1	2.9	2.5	2.4	3.6	1.8	1.95	1.9	1.95	1.95	1.95	1.75
23.....	2.1	2.85	3.0	2.3	2.9	1.75	1.95	1.85	1.95	1.95	1.95	1.75
24.....	2.3	2.8	4.1	2.2	2.65	1.75	1.9	1.85	1.95	1.95	1.95	1.75
25.....	2.8	2.7	6.0	2.2	2.45	1.7	1.85	1.75	1.95	1.95	1.9	1.7
26.....	3.0	2.7	5.7	2.3	2.45	1.75	1.85	1.75	2.0	1.95	1.9	1.7
27.....	3.0	2.65	5.8	2.1	2.55	1.7	1.85	1.65	2.0	1.95	1.95	1.7
28.....	3.1	2.6	4.8	2.0	2.35	1.7	1.85	1.7	1.95	1.95	1.95	1.7
29.....	3.4	2.55	3.5	2.0	2.25	1.75	1.75	1.6	1.95	1.95	2.0	1.8
30.....	3.6	3.1	2.0	2.25	1.8	1.7	1.55	1.95	1.95	1.95	1.8
31.....	3.5	2.8	2.3	1.65	1.6	2.0	1.8

NOTE.—The mean daily Bristol automatic gage readings reduced to the staff gage datum have been used, except Jan. 1 to Apr. 30 and Sept. 30 to Oct. 10, for which periods the staff readings have been used. Gage heights distorted by ice Jan. 1 to Mar. 27 and Nov. 25 to Dec. 31.

Daily discharge, in second-feet, of Dry Fork of Marias River near Valier, Mont., for 1912.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1.....	83	14	24	3.8	1.5	0.8	5.6	10
2.....	113	9	20	20	1.5	.8	5.6	10
3.....	113	9	16	20	1.8	.8	5.6	10
4.....	98	9	13	20	3.0	1.8	5.6	10
5.....	58	12	7.3	13	3.8	1.8	5.6	7.3
6.....	47	12	7.3	10	7.3	2.2	5.6	7.3
7.....	47	9	13	10	3.8	5.6	7.3	7.3
8.....	33	9	16	5.6	2.2	5.6	3.8	7.3
9.....	24	7	13	3.8	2.2	3.0	3.8	13
10.....	22	7	13	3.8	1.5	2.2	3.8	13
11.....	24	7	7.3	3.8	1.2	2.2	20	13
12.....	17	3.5	7.3	3.0	1.0	2.2	28	10
13.....	18	3.5	7.3	3.0	1.0	1.8	24	7.3
14.....	26	5	5.6	3.0	.8	1.8	16	7.3
15.....	28	5	3.8	3.8	.8	1.5	13	5.6
16.....	37	5	3.8	2.2	1.0	1.5	10	7.3
17.....	30	2	3.0	2.2	.8	1.2	7.3	7.3
18.....	30	2	3.0	3.0	1.0	1.0	5.6	7.3
19.....	90	2	2.2	5.6	3.0	2.2	7.3	7.3
20.....	106	2	2.2	3.8	1.8	3.8	5.6	7.3
21.....	68	600	3.0	5.6	5.6	5.6	5.6	5.6
22.....	45	238	2.2	5.6	3.8	5.6	5.6	5.6
23.....	37	106	1.8	5.6	3.0	5.6	5.6	5.6
24.....	28	70	1.8	3.8	3.0	5.6	5.6	5.6
25.....	300	28	48	1.5	3.0	1.8	5.6	3.0
26.....	242	40	43	1.8	3.0	1.8	7.3	3.0
27.....	250	22	52	1.5	3.0	1.2	7.3	3.0
28.....	480	17	32	1.5	3.0	1.5	5.6	3.0
29.....	200	18	24	1.8	1.8	1.0	5.6	3.0
30.....	130	18	24	2.2	1.5	.8	5.6	3.0
31.....	83	28	1.2	1.0	7.3

NOTE.—Daily discharge determined as follows: Mar. 28 to Apr. 8, May 1-14, and May 27 to Nov. 24 from three fairly well-defined rating curves. Apr. 9-30 and May 15-25 by shifting channel methods. Daily discharge estimated Mar. 25-27 and Nov. 25-30.

Monthly discharge of Dry Fork of Marias River near Valier, Mont., for 1912.

Month.	Discharge in second-feet.			(Run-off total in acre-feet.)	Accuracy.
	Maximum.	Minimum.	Mean.		
March 25-31.....	480	83	241	3,350	D.
April.....	113	17	45.5	2,710	C.
May.....	600	2.0	45.1	2,770	C.
June.....	24	1.5	6.91	411	B.
July.....	20	1.2	5.82	358	B.
August.....	7.3	.8	2.11	130	B.
September.....	7.3	.8	3.44	205	B.
October.....	28	3.8	8.14	501	B.
November.....	13	3.0	7.18	427	B.
December.....			a 2.0	123	D.
The period				11,000	

a Estimated.

TETON RIVER AT STRABANE,¹ MONT.

Location.—In the SE. $\frac{1}{4}$ NE. $\frac{1}{4}$ sec. 35, T. 25 N., R. 7 W., on the highway bridge half a mile north of Peeble's ranch, 16 miles above Chouteau, Mont., at Strabane post office.

Records available.—November 26, 1904, to December 31, 1906; January 16, 1908 to December 31, 1912.

Drainage area.—140 square miles.

Gage.—The original gage was spiked to a post on the left bank about 40 feet above the bend of Kroff's irrigation ditch. On March 9, 1905, it was moved by the observer to a point 250 feet upstream to avoid the effect of the dam erected at the head of the ditch below. On May 8, 1905, the gage was referred to the bench marks and it was found that the datum had been raised 0.7 foot in moving; the difference between the level of the water surface at the old site and that at the new was 0.20 foot; on May 8, 1906, the gage was again moved $1\frac{1}{2}$ miles upstream to Mr. Bjornstad's ranch and set at an entirely different datum. The station was discontinued during 1907 and when it was reestablished in 1908 a standard chain gage was installed on the left bank. On March 23, 1911, a new station was established half a mile downstream from the old gage. The gage is a standard chain fastened to the upstream side of the bridge near the center of the river.

Channel.—Shifts at high stages; current swift. There are several channels at both low and high stages, but the main channel carries about 80 per cent of the flow at high stages and 85 per cent at low stages. The results show the total flow of all the channels.

Discharge measurements.—At flood stages made from the bridge at the gage; at low stages by wading at various sections.

Winter flow.—Not affected by ice.

Diversions and storage.—Practically no water is diverted above the station, but the ordinary flow below the station is appropriated and used for irrigation. An irrigation project now being constructed under the Carey Act will store the flood water at Teton River in the reservoir about 5 miles north of the gaging section. The capacity of the reservoir is 106,700 acre-feet and it can be increased to 210,000 acre-feet by raising the top of the dam 20 feet. The reservoir will serve 55,400 acres of land on the north side of the river. The water will be diverted half a mile above the gage.

Accuracy.—Accurate determination of discharge during high stages is difficult because of the shifting channel.

¹ Station was described in earlier reports as "Teton River near Bellevue, Mont." Post office was moved from Bellevue to Strabane in 1910.

Discharge measurements of Teton River at Strabane, Mont., in 1912.

[Belle Peebles, observer.]

Date.	Hydrographer.	Gage height.	Dis-charge.	Date.	Hydrographer.	Gage height.	Dis-charge.
Apr. 3 ^a	B. E. Jones.....	<i>Feet.</i> 2.99	<i>Sec.-ft.</i> 46	Sept. 16	C. S. Heidel.....	<i>Feet.</i> 3.26	<i>Sec.-ft.</i> 73
May 25	C. S. Heidel.....	4.95	612	Dec. 17do.....	3.05	52
July 10do.....	3.87	170				

Daily gage height, in feet, of Teton River at Strabane, Mont., for 1912.

[Belle Peebles, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1.....	2.85	2.82	2.85	2.9	3.25	4.85	4.3	3.6	3.38	3.3	3.3	3.15
2.....	2.82	2.80	2.85	2.95	3.3	4.85	4.25	3.6	3.38	3.3	3.3	3.15
3.....	2.80	2.85	2.78	3.0	3.3	4.85	4.2	3.6	3.38	3.3	3.3	3.15
4.....	2.78	2.85	2.75	3.0	3.35	4.8	4.1	3.6	3.35	3.3	3.3	3.15
5.....	2.75	2.85	2.70	3.05	3.35	4.8	4.05	3.5	3.4	3.35	3.3	3.15
6.....	2.75	3.02	2.72	3.05	3.42	4.8	4.1	3.55	3.4	3.35	3.3	3.15
7.....	2.72	3.05	2.78	3.05	3.55	4.75	4.1	3.50	3.35	3.32	3.3	3.1
8.....	2.70	3.08	2.75	3.05	3.6	4.7	4.05	3.48	3.32	3.3	3.3	3.1
9.....	2.72	3.10	2.82	3.1	3.8	4.8	4.0	3.48	3.30	3.3	3.3	3.1
10.....	2.65	3.05	2.80	3.1	3.9	5.0	3.9	3.38	3.32	3.3	3.3	3.1
11.....	2.65	3.08	2.75	3.1	3.95	4.9	3.9	3.40	3.30	3.3	3.3	3.1
12.....	2.68	3.00	2.75	3.1	4.0	4.9	3.85	3.38	3.30	3.3	3.3	3.05
13.....	2.60	3.02	2.70	3.15	4.05	5.0	3.9	3.38	3.38	3.35	3.3	3.05
14.....	2.62	3.00	2.72	3.15	4.15	4.9	3.9	3.38	3.35	3.35	3.3	3.05
15.....	2.60	3.00	2.70	3.15	4.2	4.8	3.85	3.38	3.35	3.35	3.3	3.0
16.....	2.60	3.08	2.68	3.15	4.45	4.7	3.8	3.40	3.35	3.35	3.3	3.00
17.....	2.62	3.05	2.72	3.1	4.6	4.6	3.8	3.42	3.35	3.35	3.3	3.02
18.....	2.65	3.12	2.70	3.10	4.65	4.6	3.8	3.42	3.35	3.3	3.3	3.02
19.....	2.58	3.10	2.72	3.12	4.7	4.6	3.8	3.42	3.35	3.3	3.3	2.95
20.....	2.55	3.05	2.70	3.15	5.2	4.65	3.75	3.42	3.35	3.3	3.25	2.95
21.....	2.60	3.08	2.72	3.18	5.3	4.6	3.7	3.38	3.35	3.3	3.25	2.78
22.....	2.62	3.00	2.78	3.20	5.4	4.6	3.75	3.38	3.35	3.3	3.25	2.75
23.....	2.65	3.02	2.75	3.2	5.25	4.55	3.75	3.38	3.35	3.3	3.25	2.7
24.....	2.72	3.00	2.78	3.20	5.0	4.55	3.7	3.32	3.35	3.3	3.2	2.60
25.....	2.65	2.98	2.80	3.22	4.95	4.55	3.7	3.30	3.35	3.3	3.2	2.55
26.....	2.65	2.98	2.80	3.25	5.05	4.4	3.6	3.32	3.35	3.3	3.2	2.68
27.....	2.72	3.00	2.78	3.25	5.2	4.4	3.65	3.32	3.35	3.35	3.2	2.70
28.....	2.75	2.98	2.72	3.2	5.05	4.35	3.65	3.32	3.3	3.35	3.2	2.7
29.....	2.78	2.85	2.72	3.25	5.0	4.35	3.65	3.32	3.3	3.35	3.2	2.65
30.....	2.75	3.25	4.9	4.3	3.6	3.30	3.3	3.3	3.15	2.65
31.....	2.78	4.9	3.6	3.38	3.3	2.7

Daily discharge, in second-feet, of Teton River near Strabane, Mont., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1.....	35	33	35	38	72	550	280	124	89	78	78	61
2.....	33	32	35	42	78	550	265	124	89	78	78	61
3.....	32	35	31	47	78	550	250	124	89	78	78	61
4.....	31	35	29	47	85	520	223	124	85	78	78	61
5.....	29	35	26	52	85	520	212	108	92	85	78	61
6.....	29	49	27	52	95	520	223	116	92	85	78	61
7.....	27	52	31	52	116	490	223	108	85	81	78	56
8.....	26	54	29	52	124	460	212	105	81	78	78	56
9.....	27	56	33	56	158	520	200	105	78	78	78	56
10.....	24	52	32	56	178	645	178	89	81	78	78	56
11.....	24	54	29	56	189	580	178	92	78	78	78	56
12.....	25	47	29	56	200	580	168	89	78	78	78	52
13.....	22	49	26	61	212	645	178	89	89	85	78	52
14.....	23	47	27	61	236	580	178	89	85	85	78	52
15.....	22	47	26	61	250	520	168	89	85	85	78	47

Daily discharge, in second-feet, of Teton River near Strabane, Mont., for 1912—Contd.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
16.....	22	54	25	61	338	460	158	92	85	85	78	47
17.....	23	52	27	56	405	405	158	95	85	85	78	49
18.....	20	58	26	56	432	405	158	95	85	78	78	42
19.....	21	56	27	58	460	405	158	95	85	78	78	42
20.....	20	52	26	61	785	432	149	95	85	78	72	42
21.....	22	54	27	64	855	405	140	89	85	78	72	31
22.....	23	47	31	66	925	405	149	89	85	78	72	29
23.....	24	49	29	66	820	382	149	89	85	78	72	27
24.....	27	47	31	66	645	382	140	81	85	78	66	22
25.....	24	45	32	63	612	382	140	78	85	78	66	20
26.....	24	45	32	72	680	315	124	81	85	78	66	25
27.....	27	47	31	72	785	315	132	81	85	85	66	26
28.....	29	45	27	66	680	298	132	81	78	85	66	26
29.....	31	35	27	72	645	298	132	81	78	85	66	24
30.....	29	30	72	580	280	124	78	78	78	61	24
31.....	31	34	580	124	89	78	26

NOTE.—Daily discharge determined from a rating curve well defined between 60 and 250 second-feet and fairly well defined at all other stages.

Monthly discharge of Teton River near Strabane, Mont., for 1912.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accu- racy. ^a
	Maximum.	Minimum.	Mean.		
January.....	35	20	26.0	1,600	B
February.....	58	32	47.0	2,700	B
March.....	35	25	29.3	1,800	B
April.....	72	38	58.8	3,500	A
May.....	925	72	399	24,500	B
June.....	645	280	460	27,400	B
July.....	280	124	174	10,700	A
August.....	124	78	95.6	5,880	A
September.....	92	78	84.3	5,020	A
October.....	85	78	80.4	4,940	A
November.....	78	61	74.2	4,420	A
December.....	61	20	43.8	2,660	B
The year.....	925	20	131	95,200	

^a Accuracy for winter months is reduced on account of the possibility of ice effect.

DEEP CREEK AT FRAZIER'S RANCH, NEAR CHOUTEAU, MONT.

Location.—Near the center of sec. 26, T. 23 N., R. 8 W., about 22 miles southwest of Chouteau and above the mouth of Barrett Creek.

Records available.—May 25, 1912, to November 15, 1912.

Drainage area.—Not measured.

Gage.—An overhanging chain gage.

Discharge measurements.—Made by wading at a ford about 1,000 feet above the gage.

Channel.—The channel is rocky and nonshifting.

Winter flow.—Affected by ice.

Diversions.—None above the station.

Accuracy.—Conditions for obtaining accurate discharge data are good, but the rating curve for 1912 is only fairly well defined by the measurements so far made.

Discharge measurements of Deep Creek at Frazier's ranch, near Chouteau, Mont., in 1912.

Date.	Hydrographer.	Gage height.	Dis-charge.
May 5-25	B. F. Jones.....	Feet. 4.01	Sec.-ft. 197
July 7-10do.....	3.09	49
Aug. 21do.....	2.89	30

NOTE.—The following point was computed for the section at the gage by Kutter's formula, using slope and section as determined on May 25, 1912, and a value of "n," computed from the measurement of same date: Gage height, 4.50 feet; discharge, 307 second-feet; "n" found equal to .0384.

Daily gage height, in feet, of Deep Creek at Frazier's ranch, near Chouteau, Mont., for 1912.

[J. Frazier, observer.]

Day.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Day.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1.....		3.8	3.2	2.90	2.9	2.9	2.8	16.....		3.6	3.0	3.3	2.9	2.9
2.....		3.9	3.2	2.92	2.9	2.9	2.8	17.....		3.6	3.15	2.9	2.9	2.9
3.....		3.8	3.1	3.00	3.0	2.9	2.8	18.....		3.7	3.0	2.9	2.85	2.9
4.....		3.8	3.2	3.0	3.0	2.9	2.8	19.....		3.7	3.0	2.9	2.85	2.9
5.....		3.7	3.0	3.0	2.9	2.9	2.8	20.....		3.5	3.0	2.8	2.8	2.9
6.....		3.7	3.1	2.9	2.9	2.9	2.8	21.....		3.6	3.1	2.9	2.8	2.8
7.....		3.8	3.1	2.9	3.0	2.9	2.8	22.....		3.5	3.0	2.9	2.8	2.8
8.....		3.9	3.0	2.9	3.0	2.9	2.8	23.....		3.4	3.0	2.9	2.8	2.8
9.....		4.0	3.1	2.9	3.0	2.9	2.8	24.....		3.5	3.0	2.9	2.8
10.....		4.0	3.05	2.9	3.1	2.9	2.8	25.....	4.0	3.4	3.05	2.9	2.8
11.....		3.9	3.1	2.9	3.0	2.9	2.8	26.....	4.5	3.3	3.05	2.9	2.8
12.....		3.9	3.1	2.9	3.0	2.9	2.8	27.....	4.5	3.3	2.9	2.9	2.8
13.....		3.8	3.15	2.95	2.9	2.9	2.8	28.....	4.2	3.2	2.9	2.9	2.8
14.....		3.8	3.1	2.92	2.9	2.9	2.8	29.....	4.2	3.2	2.9	2.9	2.8
15.....		3.7	3.05	2.90	2.9	2.9	2.8	30.....	4.1	3.2	2.9	2.9	2.8
								31.....	3.9	3.0	2.9	2.8

Daily discharge, in second-feet, of Deep Creek at Frazier's ranch, near Chouteau, Mont., for 1912.

Day.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Day.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1.....		156	62	30	30	30	22	16.....		121	40	75	30	30
2.....		176	62	32	30	30	22	17.....		121	56	30	30	30
3.....		156	50	40	40	30	22	18.....		138	40	30	26	30
4.....		156	62	40	40	30	22	19.....		138	40	30	26	30
5.....		138	40	40	30	30	22	20.....		104	40	22	22	30
6.....		138	50	30	30	30	22	21.....		121	50	30	22	22
7.....		156	50	30	40	30	22	22.....		104	40	30	22	22
8.....		176	40	30	40	30	22	23.....		89	40	30	22	22
9.....		196	50	30	40	30	22	24.....		104	40	30	23	22
10.....		196	45	30	50	30	22	25.....	196	89	45	30	24	22
11.....		176	50	30	40	30	22	26.....	307	75	45	30	25	22
12.....		176	50	30	40	30	22	27.....	307	75	30	30	26	22
13.....		156	56	35	30	30	22	28.....	240	62	30	30	27	22
14.....		156	50	32	30	30	22	29.....	240	62	30	30	28	22
15.....		138	45	30	30	30	22	30.....	218	62	30	30	29	22
								31.....	176	40	30	22

NOTE.—Daily discharge determined from a fairly well-defined rating curve. Discharge interpolated for days for which gage heights are missing.

Monthly discharge of Deep Creek at Frazier's ranch, near Chouteau, Mont., for 1912.

[Drainage area, 38 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
May 25-31.....	307	176	241	6.34	1.65	3,350	B.
June.....	196	62	130	3.42	3.82	7,740	B.
July.....	62	30	45.1	1.19	1.37	2,770	B.
August.....	75	22	32.5	.855	.99	2,000	B.
September.....	50	22	30.7	.808	.90	1,830	B.
October.....	30	22	27.2	.716	.83	1,670	B.
November 1-15.....	22	22	22.0	.579	.32	654	B.
The period.....						20,000	

DEEP CREEK NEAR CHOUTEAU, MONT.

Location.—In the SW. $\frac{1}{4}$ NW. $\frac{1}{4}$ sec. 15, T. 15 N., R. 5 W., at Hugh Robinson's ranch, 5 miles southwest of Chouteau, Mont.

Records available.—March 24, 1911, to December 31, 1912.

Drainage area.—Not measured.

Gage.—Standard overhanging chain on right bank.

Channel.—Clean and fairly permanent; bed composed of gravel; gravel bar about 50 feet below the gage forms the control.

Discharge measurements.—Made by wading.

Winter flow.—Affected by ice.

Diversions.—A few small ditches divert water from the creek.

Accuracy.—Records good.

Discharge measurements of Deep Creek near Chouteau, Mont., in 1912.

Date.	Hydrographer.	Gage height.	Discharge.
Apr. 2	B. E. Jones.....	Feet. 6.20	Sec.-ft. 140
May 24do.....	7.14	472
Aug. 22do.....	5.75	51

NOTE.—The following point was computed by Kutter's formula, using cross section as obtained Mar. 24, 1911, and slope as obtained May 24, 1912, for section at gage at gage height of 7.10 feet: Gage height, 8.0 feet; discharge, 885 second-feet; value of "n," .0278; slope, .00222.

Daily gage height, in feet, of Deep Creek near Chouteau, Mont., for 1912.

[H. Robinson, observer.]

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1.....		5.8	5.95	6.65	6.1	5.65	5.65	5.7	5.9
2.....		6.0	5.95	6.65	6.15	5.75	5.6	5.7	5.75
3.....		6.0	5.95	6.6	6.15	5.75	5.6	5.65	5.75
4.....		6.0	5.95	6.5	6.1	5.9	5.95	5.65	5.75
5.....		5.95	5.95	6.45	6.05	5.8	5.8	5.65	5.7
6.....		5.85	5.95	6.45	6.0	5.75	5.75	5.7	5.7
7.....		5.8	5.95	6.4	5.95	5.75	5.7	5.7	5.7
8.....		5.8	5.9	6.4	5.95	5.7	5.7	5.7	5.7
9.....		5.85	5.9	6.5	5.95	5.7	5.7	5.7	5.7
10.....		5.9	6.15	6.5	5.9	5.7	5.65	5.7	5.7

Daily gage height, in feet, of Deep Creek near Chouteau, Mont., for 1912—Continued.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
11.....		5.9	6.15	6.5	5.9	5.7	5.65	5.7	5.75
12.....		5.9	6.1	6.5	5.95	5.65	5.65	5.7	5.75
13.....		5.9	6.05	6.45	5.95	5.65	5.65	5.7	5.75
14.....		5.9	6.1	6.4	5.9	5.65	5.65	5.65	5.7
15.....		5.85	6.1	6.35	5.9	5.6	5.65	5.6	5.65
16.....		5.9	6.2	6.2	5.85	5.6	5.65	5.6	5.65
17.....		6.05	6.3	6.15	5.85	5.75	5.65	5.6	5.7
18.....	5.5	6.0	6.3	6.2	5.9	5.7	5.65	5.55	5.7
19.....		6.1	6.3	6.2	5.8	5.8	5.6	5.6	5.7
20.....		6.1	7.3	6.1	5.75	5.9	5.6	5.6	5.7
21.....		6.0	8.4	6.1	5.75	5.85	5.6	5.6	5.7
22.....		5.95	8.0	6.15	5.75	5.75	5.6	5.55	5.65
23.....		5.95	7.7	6.15	5.75	5.7	5.65	5.65	5.65
24.....	5.8	5.95	7.3	6.1	5.75	5.65	5.7	5.65	5.65
25.....	6.5	5.95	7.0	6.1	5.7	5.6	5.7	5.7	5.65
26.....	6.4	5.95	6.95	6.05	5.7	5.6	5.7	5.7	5.65
27.....	6.3	5.95	7.0	6.0	5.65	5.6	5.7	5.7	5.65
28.....	6.4	5.95	7.0	6.0	5.65	5.6	5.7	5.7	5.65
29.....	6.1	5.95	6.85	5.95	5.65	5.65	5.7	5.7	5.75
30.....	6.1	5.95	6.8	5.95	5.65	5.65	5.7	5.75	5.55
31.....	5.9		6.7		5.65	5.65		5.8	

NOTE.—Gage heights previous to Apr. 1 probably affected by ice.

Daily discharge, in second-feet, of Deep Creek near Chouteau, Mont., for 1912.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1.....	58	86	278	118	36	36	43	76
2.....	96	86	278	130	50	30	43	50
3.....	96	86	260	130	50	30	36	50
4.....	96	86	227	118	76	86	36	50
5.....	86	86	212	107	58	58	36	43
6.....	67	86	212	96	50	50	43	43
7.....	58	86	196	86	50	43	43	43
8.....	58	76	196	86	43	43	43	43
9.....	67	76	227	86	43	43	43	43
10.....	76	130	227	76	43	36	43	43
11.....	76	130	227	76	43	36	43	50
12.....	76	118	227	86	36	36	43	50
13.....	76	107	212	86	36	36	43	50
14.....	76	118	196	76	36	36	36	43
15.....	67	118	182	76	30	36	30	36
16.....	76	142	142	67	30	36	30	36
17.....	107	168	130	67	50	36	30	43
18.....	96	168	142	76	43	36	24	43
19.....	118	168	142	58	58	30	30	43
20.....	118	550	118	50	76	30	30	43
21.....	96	1,090	118	50	67	30	30	43
22.....	86	890	130	50	50	30	24	36
23.....	86	740	130	50	43	36	36	36
24.....	86	550	118	50	36	43	36	36
25.....	86	415	118	43	30	43	43	36
26.....	86	394	107	43	30	43	43	36
27.....	86	415	96	36	30	43	43	36
28.....	86	415	96	36	30	43	43	36
29.....	86	352	86	36	36	43	43	50
30.....	86	333	86	36	36	43	50	24
31.....		296		36	36		58	

NOTE.—Daily discharge determined from a well-defined rating curve.

Monthly discharge of Deep Creek near Chouteau, Mont., for 1912.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accu- racy.
	Maximum.	Minimum.	Mean.		
April.....	118	58	83.8	4,990	A.
May.....	1,090	76	276	17,000	A.
June.....	278	86	171	10,200	A.
July.....	130	36	71.5	4,400	A.
August.....	76	30	43.9	2,700	A.
September.....	86	30	40.0	2,380	A.
October.....	58	24	38.6	2,370	A.
November.....	76	24	43.0	2,560	A.
The period.....				46,600	

WILLOW CREEK NEAR CHOUTEAU, MONT.

Location.—In sec. 14, T. 23 N., R. 6 W., at McPhee's ranch, 12 miles southwest of Chouteau, Mont.

Records available.—April 2, 1912, to December 31, 1912.

Drainage area.—Not measured.

Gage.—Staff gage on left bank. Low-water section reads to 5.00 feet; high-water section reads 5.00 to 9.00 feet.

Channel.—Fairly permanent.

Discharge measurements.—Made by wading at the gage except in extreme high water, when they may be made from a bridge half a mile below the gage.

Winter flow.—Affected by ice. Probably little flow.

Diversions.—There are several diversions above the station, mostly to water hay land, and not much water is used except during very dry spells.

Accuracy.—Conditions for obtaining accurate discharge data are good.

Discharge measurements of Willow Creek near Chouteau, Mont., in 1912.

Date.	Hydrographer.	Gage height.	Dis- charge.
Apr. 2	B. E. Jones.....	<i>Feet.</i>	<i>Sec.-ft.</i>
May 24	do.....	2.28	68
July 11	do.....	3.20	215
Aug. 22	do.....	1.64	11.2
		1.69	12.6

Daily gage height, in feet, of Willow Creek near Chouteau, Mont., for 1912.

[S. A. McPhee, observer.]

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1		1.99	2.27	1.79	1.52	1.5	1.63	1.73
2	2.28	1.99	2.20	1.89	1.56	1.50	1.63	1.75
3	2.38	1.96	2.14	1.94	1.57	1.47	1.60	1.73
4	2.25	1.96	2.10	1.79	1.63	1.65	1.6	1.70
5	2.01	1.93	2.05	1.74	1.63	1.75	1.65	1.70
6	2.00			1.72	1.60	1.70	1.67	1.67
7		1.96	2.03	1.69	1.57	1.67	1.65	1.70
8	1.98	1.93	2.01	1.66	1.57	1.65	1.65	1.75
9	2.02	1.91		1.64	1.55	1.6	1.67	1.73
10	2.00	2.00	1.93	1.64	1.55	1.55	1.67	
11	2.05	1.94	1.93	1.64	1.5	1.53	1.67	
12	2.0	1.92	1.91	1.69	1.45	1.50	1.67	
13		1.92	1.93	1.74	1.45	1.5	1.65	
14	1.95	1.92	1.83	1.69	1.45	1.55	1.65	
15	1.93	1.92	1.78	1.66	1.43	1.57	1.65	
16	1.96			1.64	1.45	1.60	1.63	
17	2.06	1.92	1.78	1.64	1.5	1.57	1.63	
18		1.92	1.73	1.69	1.55	1.55	1.65	
19	2.21		1.73	1.72	1.60	1.53	1.65	
20	2.21		1.68	1.69	1.63		1.63	

Daily gage height, in feet, of Willow Creek near Chouteau, Mont., for 1912—Continued.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
21.....	2.13	5.8	1.63	1.64	-----	1.57	1.60	-----
22.....	2.09	4.3	1.61	1.66	1.70	1.60	1.65	-----
23.....	2.16	-----	1.55	1.66	1.57	1.6	1.65	-----
24.....	2.06	3.2	1.53	1.64	1.53	1.65	1.65	-----
25.....	2.01	3.0	1.53	1.64	1.47	1.65	1.65	-----
26.....	2.01	2.8	1.51	1.59	1.45	1.73	1.65	-----
27.....	2.01	2.75	1.53	1.54	1.47	1.70	1.67	-----
28.....	2.01	2.6	1.51	1.52	1.42	1.67	1.67	-----
29.....	2.03	2.55	1.48	1.49	1.50	1.65	1.70	-----
30.....	-----	2.4	1.44	1.49	1.53	1.63	1.73	-----
31.....	-----	2.37	-----	1.49	1.53	-----	1.73	-----

Daily discharge, in second-feet, of Willow Creek near Chouteau, Mont., for 1912.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1.....	55	34	66	19	6	5	10	16
2.....	67	34	57	28	7	5	10	17
3.....	81	32	50	30	8	4	9	16
4.....	64	32	45	19	10	12	9	14
5.....	36	29	40	16	10	17	12	14
6.....	35	30	39	15	9	14	12	12
7.....	34	32	38	14	8	12	12	14
8.....	33	29	36	12	8	12	12	17
9.....	37	28	32	11	7	9	12	16
10.....	35	35	29	11	7	7	12	-----
11.....	40	30	29	11	5	6	12	-----
12.....	35	29	28	14	4	5	12	-----
13.....	33	29	22	16	4	5	12	-----
14.....	31	29	22	14	4	7	12	-----
15.....	29	29	19	12	3	8	12	-----
16.....	32	29	19	11	4	9	10	-----
17.....	41	29	19	11	5	8	10	-----
18.....	50	29	16	14	7	7	12	-----
19.....	58	45	16	15	9	6	12	-----
20.....	58	350	13	14	10	7	10	-----
21.....	49	735	10	11	12	8	9	-----
22.....	44	435	10	12	14	9	12	-----
23.....	52	325	7	12	8	9	12	-----
24.....	41	215	6	11	6	12	12	-----
25.....	36	178	6	11	4	12	12	-----
26.....	36	146	5	9	4	16	12	-----
27.....	36	138	6	7	4	14	12	-----
28.....	36	114	5	6	3	12	12	-----
29.....	38	106	4	5	5	12	14	-----
30.....	36	84	3	5	6	10	16	-----
31.....	-----	80	-----	5	6	-----	16	-----

NOTE.—Daily discharge determined from a rating curve fairly well defined below a gage height of 3.50 feet and poorly defined at higher gage heights. Discharge interpolated for days for which gage heights are missing.

Monthly discharge of Willow Creek near Chouteau, Mont., for 1912.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accu- racy.
	Maximum.	Minimum.	Mean.		
April.....	81	29	42.9	2,550	B.
May.....	735	28	113	6,950	B.
June.....	66	3	23.2	1,380	B.
July.....	30	5	12.9	793	B.
August.....	14	3	6.7	412	B.
September.....	17	4	9.3	553	B.
October.....	16	9	11.7	719	B.
November 1-9.....	17	12	15.1	270	B.
The period.....	-----	-----	-----	13,600	-----

MUDDY CREEK NEAR BYNUM, MONT.

Location.—In sec. 27, T. 26 N., R. 6 W., just above the mouth of Blackleaf Creek and about 2 miles above Bynum.

Records available.—May 24, 1912, to December 31, 1912.

Drainage area.—Not measured.

Gage.—Overhanging chain gage on the left bank.

Channel.—Shifts at all stages.

Discharge measurements.—Made by wading near the gage.

Winter flow.—Affected by ice.

Diversions.—The summer flow is appropriated and used and the flood waters have been filed on by the Teton Cooperative Reservoir Co.

Accuracy.—Frequent discharge measurements are necessary to insure good results.

Discharge measurements of Muddy Creek near Bynum, Mont., in 1912.

Date.	Hydrographer.	Gage height.	Discharge.
		<i>Feet.</i>	<i>Sec.-ft.</i>
May 24	C. S. Heidel.....	2.70	84
July 10do.....	2.17	2.9
Sept. 15do.....	2.17	1.7
Dec. 17do.....	^a 2.20	2.9

^a Ice present.

Daily gage height, in feet, of Muddy Creek near Bynum, Mont., for 1912.

[A. Baudendistel, observer.]

Day.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1		2.6	2.25	2.1	2.1	2.2	2.25	2.15
2		2.6	2.3	2.5	2.1	2.2	2.15	2.2
3		2.55	2.3	2.5	2.05	2.15	2.15	2.2
4		2.5	2.3	2.2	2.25	2.2	2.15	2.2
5		2.5	2.25	2.2	2.25	2.2	2.25	2.2
6		2.5	2.25	2.15	2.2	2.15	2.2	2.2
7		2.5	2.2	2.1	2.15	2.1	2.2	2.2
8		2.45	2.25	2.1	2.15	2.2	2.2	2.2
9		2.4	2.2	2.15	2.15	2.2	2.2	2.2
10		2.5	2.15	2.15	2.1	2.2	2.25	2.2
11		2.65	2.25	2.1	2.2	2.2	2.1
12		2.5	2.25	2.1	2.2	2.2	2.15
13		2.4	2.3	2.5	2.25	2.25	2.1
14		2.4	2.3	2.1	2.15	2.25	2.15
15		2.3	2.25	2.1	2.2	2.2	2.25	2.15
16		2.45	2.25	2.5	2.15	2.2	2.2
17		2.35	2.3	2.5	2.15	2.15	2.2	2.2
18		2.3	2.3	2.1	2.15	2.2	2.15
19		2.25	2.2	2.15	2.2	2.15	2.15
20		2.25	2.25	2.2	2.15	2.2	2.2
21		2.3	2.2	2.2	2.15	2.15	2.15
22		2.2	2.2	2.15	2.15	2.2	2.15
23		2.15	2.2	2.1	2.2	2.15	2.15
24		2.7	2.2	2.1	2.15	2.15	2.2
25		2.65	2.15	2.15	2.15	2.5	2.15
26	2.8	2.2	2.15	2.15	2.15	2.15	2.15
27	2.75	2.1	2.15	2.15	2.2	2.2	2.2
28	2.7	2.1	2.1	2.15	2.15	2.15	2.2
29	2.65	2.05	2.15	2.15	2.1	2.15	2.2
30	2.7	2.15	2.15	2.15	2.15	2.25	2.2
31	2.65	2.1	2.05	2.25

Daily discharge, in second-feet, of Muddy Creek near Bynum, Mont., for 1912.

Day.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1.		58	8	1	0	3	6	2
2.		58	12	38	0	3	2	3
3.		48	12	38	0	2	2	3
4.		38	12	5	6	3	2	3
5.		38	8	5	6	3	6	3
6.		38	8	3	3	2	3	3
7.		38	5	1	2	0	3	3
8.		30	8	1	2	3	3	3
9.		22	5	3	2	3	3	3
10.		38	3	3	0	3	6	3
11.		72	8	1	1	3	3	0
12.		38	8	1	1	3	3	0
13.		22	12	38	2	6	6	2
14.		22	12	1	2	2	6	2
15.		12	8	1	3	3	6	2
16.		30	8	38	2	3	3	2
17.		17	12	34	2	2	3	3
18.		12	12	0	2	3	3	
19.		8	5	2	3	2	2	
20.		8	8	3	2	3	3	
21.		12	5	3	2	2	2	
22.		5	5	2	2	3	2	
23.		3	5	0	3	2	2	
24.		86	5	0	2	2	2	
25.		72	3	2	2	34	2	
26.	114	5	3	2	2	2	2	
27.	100	1	3	2	3	3	3	
28.	86	1	1	2	2	2	3	
29.	72	1	3	2	0	2	3	
30.	86	3	3	2	2	6	3	
31.	72		1	0		6		

NOTE.—Daily discharge determined from two rating curves fairly well defined above 5 second-feet, and applicable May 24 to Aug. 16 and Aug. 17 to Dec. 17, respectively. Discharge interpolated for days for which gage heights are missing.

Monthly discharge of Muddy Creek near Bynum, Mont., for 1912.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accu- racy.
	Maximum.	Minimum.	Mean.		
May 24-31.	114	72	86.0	1,360	B.
June.	72	1	22.8	1,360	B.
July.	12	1	6.81	419	C.
August.	38	0	7.55	464	C.
September.	6	0	2.03	121	C.
October.	34	0	3.84	236	C.
November.	6	2	3.27	195	C.
December 1-17.	3	0	2.35	79	C.
The period.				4,230	

BLACKLEAF CREEK NEAR BYNUM, MONT.

Location.—In the NW. $\frac{1}{4}$ SE. $\frac{1}{4}$ sec. 22, T. 26 N., R. 6 W., about 200 feet above the mouth of the creek, and 2 miles above Bynum.

Records available.—May 24, 1912, to December 31, 1912.

Drainage area.—Not measured.

Gage.—Overhanging chain gage on the left bank.

Channel.—Shifts at all stages.

Discharge measurements.—Made by wading near the gage.

Winter flow.—Affected by ice.

Diversions.—All the summer flow is used and flood waters have been filed on by the Teton Cooperative Reservoir Co.

Accuracy.—Frequent discharge measurements are necessary to insure good results.

Discharge measurements of Blackleaf Creek near Bynum, Mont., in 1912.

Date.	Hydrographer.	Gage height.	Discharge.
May 24	C. S. Heidel	<i>Feet.</i> 2.95	<i>Sec.-ft.</i> 66
July 10	do.	2.16	6.5
Sept. 15	do.	2.03	3.2
Dec. 17	do.	2.11	3.

^a Ice present.

Daily gage height, in feet, of Blackleaf Creek near Bynum, Mont., for 1912.

[A. Baudendistel, observer.]

Day.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1		2.5	2.3	2.1	2.0	2.15	2.05	2.0
2		2.5	2.45	2.05	2.0	2.15	2.05	2.0
3		2.45	2.3	2.45	2.0	2.15	2.05	2.0
4		2.35	2.3	2.35	2.1	2.2	2.05	2.0
5		2.35	2.25	2.3	2.15	2.2	2.05	2.0
6		2.4	2.25	2.25	2.05	2.05	2.0	2.0
7		2.45	2.3	2.25	2.05	2.0	2.0	2.0
8		2.45	2.35	2.25	2.05	2.0	2.0	2.0
9		2.4	2.3	2.1	2.0	2.0	2.0	2.0
10		2.35	2.15	2.1	2.05	2.1	2.05	2.05
11		2.45	2.3	2.15		2.15	2.0	2.0
12		2.45	2.2	2.05		2.25	2.0	2.05
13		2.3	2.35	2.05		2.2	2.0	2.0
14		2.3	2.3	2.1		2.15	2.0	2.0
15		2.2	2.3	2.05	2.0	2.1	2.05	2.05
16		2.35	2.3	2.45	2.0	2.05	2.0	
17		2.3	2.45	2.45	2.0	2.05	2.0	
18		2.25	2.4	2.05	2.0	2.05	2.0	
19		2.2	2.3	2.05	2.1	2.05	2.0	
20		2.2	2.25	2.2	2.15	2.05	2.05	
21		2.15	2.25	2.15	2.1	2.0	2.0	
22		2.2	2.25	2.1	2.2	2.0	2.0	
23		2.15	2.2	2.1	2.15	2.0	1.95	
24			2.1	2.05	2.15	2.0	2.0	
25	2.95	2.1	2.15	2.0	2.15	2.1	2.05	
26	2.8	2.0	2.15	2.0	2.15	2.1	2.05	
27		1.95	2.05	2.0	2.1	2.0	1.95	
28	2.8	1.95	2.1	2.0	2.1	2.0	1.95	
29	2.75	2.0	2.45	2.05	2.1	2.0	1.95	
30	2.7	1.95	2.1	2.05	2.1	2.0	1.95	
31	2.65	2.5	2.05	2.0	2.15	2.05	2.05	
	2.65		1.95	2.0		2.05		

NOTE.—Relation of gage height to discharge affected by ice Dec. 10–15.

Daily discharge, in second-feet, of Blackleaf Creek near Bynum, Mont., for 1912.

Day.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1		22	11	5.0	2.7	6.5	3.8	2.7
2		22	19	3.8	2.7	6.5	3.8	2.7
3		19	11	19	2.7	6.5	3.8	2.7
4		14	11	14	5.0	8.0	3.8	2.7
5		14	9.5	11	6.5	8.0	3.8	2.7
6		16	9.5	9.5	3.8	3.8	2.7	2.7
7		19	11	9.5	3.8	2.7	2.7	2.7
8		19	14	9.5	3.8	2.7	2.7	2.7
9		16	11	5.0	2.7	2.7	2.7	2.7
10		14	.56	5.0	3.8	5.0	3.8	

Daily discharge, in second-feet, of Blackleaf Creek near Bynum, Mont., for 1912—Contd.

Day.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
11.....		19	11	6.5	3.8	6.5	2.7	-----
12.....		19	8.0	3.8	3.8	9.5	2.7	-----
13.....		11	14	3.8	3.4	8.0	2.7	-----
14.....		11	11	5.0	3.0	6.5	2.7	-----
15.....		8	11	3.8	2.7	5.0	3.8	-----
16.....		14	11	19	2.7	3.8	2.7	-----
17.....		11	19	19	2.7	3.8	2.7	-----
18.....		9.5	16	3.8	2.7	3.8	2.7	-----
19.....		8.0	11	3.8	5.0	3.8	2.7	-----
20.....		8.0	9.5	8.0	6.5	3.8	3.8	-----
21.....		6.5	9.5	6.5	5.0	2.7	2.7	-----
22.....		8.0	9.5	5.0	8.0	2.7	2.7	-----
23.....		6.5	8.0	5.0	6.5	2.7	2.0	-----
24.....		66	5.0	5.0	3.8	2.7	2.7	-----
25.....		48	2.7	6.5	2.7	6.5	5.0	3.8
26.....	60	2.0	3.8	2.7	5.0	2.7	2.0	-----
27.....	48	2.0	5.0	2.7	5.0	2.7	2.0	-----
28.....	43	2.7	19	3.8	5.0	2.7	2.0	-----
29.....	38	2.0	5	3.8	5.0	2.7	2.0	-----
30.....	34	22	3.8	2.7	6.5	3.8	3.8	-----
31.....	34	-----	2.0	2.7	-----	3.8	-----	-----

NOTE.—Daily discharge determined from a fairly well-defined rating curve. Discharge interpolated for days for which gage heights are missing. Dec. 10-31 discharge estimated at 2.5 second-feet.

Monthly discharge of Blackleaf Creek near Bynum, Mont., for 1912.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accu- racy.
	Maximum.	Minimum.	Mean.		
May 24-31.....	66	34	46.4	736	B.
June.....	22	2.0	11.8	702	B.
July.....	19	2.0	10.1	621	B.
August.....	19	2.7	6.75	415	B.
September.....	8	2.7	4.44	264	B.
October.....	9.5	2.7	4.55	280	B.
November.....	3.8	2.0	2.95	176	B.
December.....	-----	-----	2.56	157	C.
The period.....	-----	-----	-----	3,350	-----

MUSSELSHELL RIVER BASIN.

NORTH FORK OF MUSSELSHELL RIVER NEAR MARTINSDALE, MONT.

Location.—In sec. 6, T. 8 N., R. 12 E., half a mile above the junction of the North and South Forks, at the ranch of Martin J. Settle, 4 miles north of Martinsdale.

Records available.—May 10, 1907, to December 31, 1912.

Drainage area.—Not measured.

Gage.—Chain on left bank just above observer's private wagon bridge; datum unchanged.

Channel.—Composed of gravel; may shift somewhat during high water, as current is swift.

Discharge measurements.—Made from the private wagon bridge or by wading.

Winter flow.—Affected by ice.

Storage.—Under a Carey Act project the flood water of the North Fork, the normal flow of which is practically all appropriated, will be stored at a point about 20 miles above the station and used to irrigate land between Martinsdale and Harlowton.

Accuracy.—Records obtained during open season are very good.

Discharge measurements of North Fork of Musselshell River near Martinsdale, Mont., in 1912.

Date.	Hydrographer.	Gage height.	Dis-charge.
		<i>Feet.</i>	<i>Sec.-ft.</i>
Apr. 6	C. S. Heidel	3.96	81
June 20	do.	3.48	40
Aug. 23	do.	3.28	23
Oct. 16	do.	3.41	28

^a Ice along shore.

Daily gage height, in feet, of North Fork of Musselshell River near Martinsdale, Mont., for 1912.

[M. J. Settles, observer.]

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1		3.95	4.6	3.15	3.05	3.35	3.35	3.6	3.75
2		3.95	4.5	3.45	3.2	3.35	3.35	3.5	4.45
3		5.4	3.9	4.4	3.6	3.15	3.3	3.35	3.5
4		5.4	3.85	4.35	3.45	3.6	3.35	3.45	3.45
5		4.0	3.85	4.25	3.4	3.35	3.35	3.8	3.45
6		4.4	3.85	4.2	3.35	3.3	3.3	3.8	3.45
7		3.7	3.9	4.1	3.3	3.3	3.3	3.8	3.5
8		4.0	3.9	4.05	3.4	3.25	3.3	3.45	3.45
9		4.1	4.1	4.1	3.3	3.3	3.3	3.45	3.5
10		4.3	4.2	4.1	3.35	3.25	3.3	3.45	3.55
11		4.6	4.2	4.0	3.35	3.25	3.3	3.45	3.5
12		4.3	4.15	3.9	3.3	3.35	3.25	3.45	3.45
13		4.0	4.1	3.9	3.3	3.25	3.3	3.45	3.45
14		3.8	4.1	3.8	3.25	3.3	3.35	3.4	3.45
15		3.8	4.15	3.8	3.3	3.2	3.35	3.4	3.45
16		3.9	4.25	3.8	3.25	3.2	3.35	3.4	3.45
17		3.8	4.45	3.7	3.25	3.25	3.3	3.4	3.45
18		3.8	4.5	3.7	3.25	3.35	3.3	3.45	3.45
19		3.9	4.5	3.55	3.25	3.4	3.3	3.4	3.4
20		3.8	4.85	3.45	3.3	3.35	3.35	3.4	3.4
21		3.8	5.3	3.4	3.15	3.25	3.35	3.4	3.8
22		3.8	6.4	3.3	3.2	3.3	3.35	3.45	3.4
23		3.8	4.9	3.3	3.15	3.3	3.45	3.45	3.45
24		3.8	5.6	3.2	3.3	3.3	3.4	3.45	3.4
25		3.95	5.2	3.25	3.25	3.3	3.4	3.45	3.35
26		3.95	5.1	3.25	3.2	3.3	3.4	3.45	3.75
27		3.9	5.0	3.15	3.2	3.25	3.4	3.45	4.45
28		3.9	4.85	3.1	3.05	3.25	3.35	3.45	3.6
29		3.9	4.75	2.95	3.1	3.3	3.35	3.45	3.6
30		3.95	4.85	3.0	3.05	3.35	3.35	3.45	3.7
31			4.7		3.05	3.3		3.5	

NOTE.—Relation of gage height to discharge Apr. 3-13 and Nov. 26-Dec. 3 probably affected by ice.

Daily discharge, in second-feet, of North Fork of Musselshell River near Martinsdale, Mont., for 1912.

[M. J. Settles, observer.]

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1		104	216	13	8	28	23	48
2		104	198	37	16	28	23	37
3		96	180	54	13	24	23	37
4		88	171	37	54	28	32	32
5		88	153	32	28	28	74	32
6		88	144	28	24	24	74	32
7		96	128	24	24	24	74	37
8		96	120	32	20	24	32	32
9		128	128	24	24	24	32	37
10		144	128	28	20	24	32	42

Daily discharge, in second-feet, of North Fork of Musselshell River near Martinsdale, Mont., for 1912—Continued.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
11.....		144	112	28	20	24	32	37
12.....		136	96	24	28	20	32	32
13.....		128	96	24	20	24	32	32
14.....	80	128	80	20	24	28	27	32
15.....	80	136	80	24	16	28	27	32
16.....	96	153	80	20	16	28	27	32
17.....	80	189	66	20	20	24	27	32
18.....	80	198	66	20	28	24	32	32
19.....	96	198	48	20	32	19	27	27
20.....	80	262	37	24	28	23	27	27
21.....	80	352	32	13	20	23	27	74
22.....	80	572	24	16	24	23	32	27
23.....	80	272	24	13	24	32	32	32
24.....	80	412	16	24	24	27	32	27
25.....	104	332	20	20	24	27	32	23
26.....	104	312	20	16	24	27	32
27.....	96	292	13	16	20	27	32
28.....	96	262	10	8	20	23	32
29.....	96	243	4	10	24	23	32
30.....	104	262	5	8	28	23	32
31.....		234		8	24	37

NOTE.—Daily discharge determined from two fairly well-defined rating curves applicable to Sept. 17 and after Sept. 17 to Nov. 25, respectively. Apr. 1-13 discharge estimated at 80 second-feet.

Monthly discharge of North Fork of Musselshell River near Martinsdale, Mont., for 1912.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accu- racy.
	Maximum.	Minimum.	Mean.		
April.....	104	80	85.1	5,060	C.
May.....	572	88	202	12,400	B.
June.....	216	4	83.2	4,950	B.
July.....	54	8	22.1	1,360	B.
August.....	54	8	23.2	1,430	B.
September.....	32	19	25.1	1,490	C.
October.....	74	23	34.2	2,100	B.
November (1-25).....	74	23	34.6	1,720	B.
The period.....	30,500	

MUSSELSHELL RIVER AT HARLOWTON, MONT.

Location.—In sec. 26, T. 8 N., R. 15 E., at the highway bridge 1 mile south of Harlowton.

Records available.—July 11, 1907, to December 31, 1912. A station was maintained at Shawmut from August 12, 1902, to June 30, 1907.

Drainage area.—Not measured.

Gages.—The original gage was destroyed in October, 1908; on April 10, 1909, a temporary staff gage was installed which read 0.73 foot too high. On May 24, 1909, a standard chain gage was placed on the upstream side of the new public highway bridge at a datum 0.52 foot higher than the bench mark and the datum of the bench mark was raised 0.52 foot. All gage heights for 1909 were corrected to the new datum.

Channel.—Bed of stream composed of sand and gravel; will probably shift in flood.

Discharge measurements.—Made from bridge or by wading.

Diversions.—A large part of the valley is irrigated and many small ditches take water from the Musselshell; practically the entire flow of the stream is appropriated. A minimum discharge of 2 second-feet is recorded during the irrigation season at this station.

Discharge measurements of Musselshell River at Harlowton, Mont., in 1912.

Date.	Hydrographer.	Gage height.	Dis-charge.
		<i>Feet.</i>	<i>Sec.-ft.</i>
Apr. 8	C. S. Heidel	1.52	299
June 20do.....	1.51	338
Aug. 23do.....	.50	53
Oct. 16do.....	.70	88

Daily gage height, in feet, of Musselshell River at Harlowton, Mont., for 1912.

[W. G. Yamamoto, observer.]

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1		1.32	1.35	2.35	0.8	0.32	0.42	0.65	0.72
2		1.48	1.35	2.3	.8	.31	.42	.66	.70
3		1.70	1.35	2.3	.85	.30	.42	.69	.69
4		1.75	1.35	2.2	1.15	.31	.45	.71	.69
5		1.9	1.32	2.2	1.08	.31	.45	.75	.71
6		2.0	1.30	2.1	1.00	.30	.45	.75	.75
7		1.65	1.28	2.05	.96	.30	.45	.75	.75
8		1.5	1.25	1.9	.88	.32	.42	.78	.75
9		1.65	1.3	2.1	.81	.34	.44	.78	.75
10		1.7	1.5	2.0	.80	.38	.45	.78	.76
11		1.8	1.75	2.0	.78	.40	.46	.75	.78
12		1.8	1.65	1.95	.78	.39	.49	.74	.80
13		1.8	1.65	1.9	.76	.38	.52	.72	.82
14		1.5	1.6	1.8	.75	.38	.54	.72	.85
15	0.45	1.3	1.55	1.8	.71	.38	.58	.70	.84
16	.45	1.3	1.7	1.8	.70	.38	.58	.69	.82
17	.5	1.3	1.85	1.75	.68	.38	.58	.68	.82
18	.45	1.30	2.1	1.7	.64	.44	.58	.68	.80
19	.45	1.28	2.25	1.6	.62	.58	.58	.68	.79
20	.48	1.25	2.3	1.5	.62	.59	.55	.68	.76
21	.50	1.25	2.65	1.45	.62	.52	.55	.68	.75
22	.55	1.25	3.0	1.4	.66	.50	.56	.68	.72
23	.5	1.25	2.9	1.4	.70	.49	.58	.68	.71
24	.5	1.25	2.6	1.40	.68	.48	.60	.68	.70
25	.5	1.34	2.45	1.38	.61	.48	.61	.68	.71
26	.6	1.39	2.4	1.25	.56	.48	.62	.68	.72
27	.75	1.40	2.4	1.12	.49	.48	.65	.68	.75
28	1.12	1.38	2.4	.98	.45	.48	.65	.69	.78
29	1.10	1.35	2.4	.91	.42	.48	.64	.71	.79
30	1.02	1.35	2.3	.85	.39	.48	.62	.75	.80
31	1.08		2.4		.36	.48		.75	

Daily discharge, in second-feet, of Musselshell River at Harlowton, Mont., for 1912.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1		223	235	830	105	32	42	75	89
2		291	235	790	105	31	42	77	85
3		400	235	790	118	30	42	83	83
4		430	235	720	195	31	45	87	83
5		520	223	720	175	31	45	95	87
6		580	215	650	155	30	45	95	95
7		375	208	615	145	30	45	95	95
8		300	198	520	125	32	42	101	95
9		375	215	650	108	34	44	101	95
10		400	300	580	105	38	45	101	97

Daily discharge, in second-feet, of Musselshell River at Harlowton, Mont., for 1912—
Continued.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
11.....		460	430	580	101	40	46	95	101
12.....		460	375	552	101	39	49	93	105
13.....		460	375	525	97	38	53	89	110
14.....		300	350	470	95	38	56	89	118
15.....	25	215	325	470	87	38	62	85	115
16.....	25	215	400	470	85	38	62	83	110
17.....	30	215	490	445	81	38	62	81	110
18.....	25	215	650	420	73	44	62	81	105
19.....	25	208	755	370	69	62	62	81	108
20.....	28	198	790	325	69	64	58	81	97
21.....	30	198	1,080	305	69	53	58	81	95
22.....	35	198	1,410	285	77	50	59	81	89
23.....	30	198	1,310	285	85	49	62	81	87
24.....	30	198	1,040	285	81	48	65	81	85
25.....	30	231	910	277	67	48	67	81	87
26.....	40	251	870	228	59	48	69	81	89
27.....	65	255	870	186	49	48	75	81	95
28.....	156	247	870	150	45	48	75	83	101
29.....	150	235	870	132	42	48	73	87	108
30.....	126	235	790	118	39	48	69	95	105
31.....	144		870		36	48		95	

NOTE.—Daily discharge determined from two fairly well defined rating curves applicable through June 11 and after June 11, respectively. The curves merge above gage height 2 feet.

Monthly discharge of Musselshell River at Harlowton, Mont., for 1912.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accu- racy.
	Maximum.	Minimum.	Mean.		
March 15-31.....	156	25	58.5	1,970	B.
April.....	580	198	303	18,000	B.
May.....	1,410	198	535	36,000	B.
June.....	830	118	458	27,300	B.
July.....	195	36	91.7	5,640	B.
August.....	64	30	41.7	2,560	B.
September.....	75	42	56.0	3,330	B.
October.....	101	75	86.9	5,340	B.
November.....	118	83	97.1	5,780	B.
The period.....				106,000	

SOUTH FORK OF MUSSELSHELL RIVER NEAR MARTINSDALE, MONT.

Location.—In the S. $\frac{1}{2}$ sec. 12, T. 8 N., R. 11 E., near the public highway, $1\frac{1}{4}$ miles northeast of Martinsdale, near the blacksmith shop of the Martinsdale Sheep Co., at a point about $1\frac{1}{2}$ miles above the original site, which was near the ranch of M. J. Settle.

Records available.—June 19, 1907, to April 28, 1908 (old station); April 28, 1908, to December 31, 1912.

Drainage area.—Not measured.

Gage.—Staff nailed to tree on the right bank; datum unchanged. The datum of this gage bears no determined relation to the datum of the gage at the original station.

Channel.—Bed of stream is chiefly gravel and is clean and nonshifting.

Discharge measurements.—Made by wading near the gage or from a bridge 150 feet below.

Winter flow.—Affected by ice.

Diversions.—Many small ditches take water from the creek and during the irrigating season all the water is diverted.

Accuracy.—Open season records good.

Discharge measurements of South Fork of Musselshell River near Martinsdale, Mont., in 1912.

Date.	Hydrographer.	Gage height.	Dis-charge.
		<i>Feet.</i>	<i>Sec.-ft.</i>
Apr. 6	C. S. Heidel	2.61	108
June 20do.....	3.24	207
Aug. 23do.....	1.41	16.6
Oct. 19do.....	1.73	30

Daily gage height, in feet, of South Fork of Musselshell River near Martinsdale, Mont., for 1912.

[Nick Gesdale, observer.]

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1.....		2.7	4.4	2.3	0.95	1.38	1.35	2.25
2.....		2.7	4.4	2.45	1.05	1.35	1.32	2.20
3.....		2.65	4.5	2.55	1.05	1.35	1.30	2.25
4.....		2.4	4.4	2.75	1.20	1.45	1.55	2.25
5.....		2.4	4.2	2.4	1.15	1.45	1.68	2.20
6.....	2.6	2.4	4.1	2.4	1.10	1.40	1.62	1.58
7.....	2.5	2.5	4.0	2.3	1.25	1.35	1.62	1.80
8.....	2.75	2.9	4.1	2.25	1.40	1.30	1.62	1.82
9.....	3.1	3.35	4.4	2.1	1.35	1.32	1.82	1.88
10.....	3.2	3.45	4.1	2.1	1.55	1.30	1.78	1.88
11.....	2.55	3.5	3.9	2.0	1.50	1.32	1.75	2.1
12.....	3.1	3.4	3.7	1.90	1.50	1.30	1.78	2.05
13.....	2.65	3.15	3.8	1.80	1.50	1.32	1.75	2.0
14.....	2.4	3.3	3.7	1.78	1.50	1.42	1.72	1.80
15.....	2.4	3.6	3.7	1.70	1.50	1.42	1.72	1.90
16.....	2.5	3.9	3.6	1.65	1.50	1.40	1.72	1.85
17.....	2.4	3.9	3.4	1.70	1.50	1.38	1.75	1.85
18.....	2.5	4.1	3.3	1.75	1.70	1.32	1.72	1.90
19.....	2.45	4.5	3.2	1.60	1.70	1.35	1.72	1.75
20.....	2.35	4.7	3.25	1.42	1.65	1.28	1.68	1.60
21.....	2.25	5.0	3.25	1.35	1.65	1.28	1.62	1.50
22.....	2.4	4.9	3.25	1.35	1.60	1.28	1.65	1.65
23.....	2.6	4.5	3.15	1.40	1.50	1.38	1.72	1.80
24.....	2.7	4.2	3.15	1.32	1.50	1.42	1.72	1.75
25.....	2.75	4.0	2.8	1.30	1.50	1.40	1.72	1.90
26.....	2.6	4.3	2.7	1.25	1.50	1.40	1.72	2.0
27.....	2.65	4.5	2.6	1.20	1.55	1.40	1.78	1.95
28.....	2.6	4.4	2.4	1.20	1.50	1.38	1.82	2.0
29.....	2.55	4.5	2.3	1.20	1.45	1.38	1.92	2.05
30.....	2.85	5.1	2.3	1.15	1.40	1.32	2.05	2.0
31.....		4.7		.95	1.40		2.15	

Daily discharge, in second-feet, of South Fork of Musselshell River near Martinsdale, Mont., for 1912.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1.....		120	495	72	4	14	14	67
2.....		120	495	90	6	14	13	62
3.....		114	530	102	6	14	12	67
4.....		84	495	127	9	17	22	67
5.....		84	430	84	8	17	28	62
6.....	108	84	405	84	6	15	25	23
7.....	96	96	380	72	10	14	25	34
8.....	127	150	405	67	15	12	25	35
9.....	184	230	495	54	14	13	35	39
10.....	202	250	405	54	22	12	33	39
11.....	102	260	355	47	19	13	32	54
12.....	184	240	305	40	19	12	33	50
13.....	114	193	330	34	19	13	32	47
14.....	84	220	305	33	19	16	30	34
15.....	84	280	305	29	19	16	30	40

Daily discharge, in second-feet, of South Fork of Musselshell River near Martinsdale, Mont., for 1912—Continued.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
16.....	96	355	280	26	19	15	30	37
17.....	84	355	240	29	19	14	32	37
18.....	96	405	220	32	29	13	30	40
19.....	90	530	202	24	29	14	30	32
20.....	78	610	211	16	26	11	28	24
21.....	67	750	211	14	26	11	25	19
22.....	84	700	211	14	24	11	26	26
23.....	108	530	193	15	19	14	30	34
24.....	120	430	193	13	19	16	30	32
25.....	127	380	134	12	19	15	30	40
26.....	108	460	120	10	19	15	30	47
27.....	114	530	108	9	22	15	33	44
28.....	108	495	84	9	19	14	35	47
29.....	102	530	72	9	17	14	41	50
30.....	142	800	72	8	15	13	50	47
31.....		610		4	15		58	

NOTE.—Daily discharge determined from a well-defined rating curve.

Monthly discharge of South Fork of Musselshell River near Martinsdale, Mont., for 1912.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accu- racy.
	Maximum.	Minimum.	Mean.		
April 6-30.....	202	67	112	5,550	A.
May.....	800	84	355	21,800	A.
June.....	530	72	290	17,300	A.
July.....	127	4	39.8	2,450	A.
August.....	29	4	17.1	1,050	A.
September.....	17	11	13.9	827	A.
October.....	58	12	29.9	1,840	A.
November.....	67	19	42.5	2,530	A.
The period.....				53,300	

FLAT WILLOW CREEK NEAR FLAT WILLOW, MONT.

Location.—In sec. 23, T. 12 N., R. 25 E., at Flat Willow Ranch Co.'s ranch, 8 miles above Flat Willow and 30 miles north of Roundup.

Records available.—May 3, 1911, to December 31, 1912.

Drainage area.—Not measured.

Gage.—Staff gage, marked to tenths of feet, nailed to a timber driven into bed of stream and braced to the banks; below the wagon bridge near the ranch buildings.

Channel.—Likely to shift; current very sluggish.

Discharge measurements.—At high stages made from a footbridge behind house; at low water made by wading below house.

Winter flow.—Affected by ice.

Diversions.—Much water is diverted above the gage during the irrigating season. A canal to divert water into the storage reservoir of the Flatwillow Carey project heads about a mile above the station.

Discharge measurements of Flat Willow Creek near Flat Willow, Mont., in 1912.

Date.	Hydrographer.	Gage height.	Dis- charge.
		<i>Feet.</i>	<i>Sec.-ft.</i>
Apr. 9	C. S. Heidel.....	4.18	31
June 19do.....	4.10	88
Aug. 22do.....	2.28	3.6
Oct. 15do.....	3.00	30

Daily gage height, in feet, of Flat Willow Creek near Flat Willow, Mont., for 1912.

[J. D. Brinegar, observer.]

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1.....		4.8	6.0	2.6	2.4	2.2	2.9	3.1
2.....		4.9	5.9	2.6	2.4	2.2	2.8	3.1
3.....		5.0	5.4	3.4	2.4	2.1	2.7	3.1
4.....		5.0	5.3	3.4	2.5	2.1	2.7	3.1
5.....		5.0	5.2	3.3	2.5	2.2	2.8	3.0
6.....		5.0	5.0	3.1	2.6	2.2	2.8	3.0
7.....		5.0	4.9	3.1	2.6	2.2	2.8	3.0
8.....		4.9	4.8	3.1	2.7	2.3	2.8	3.0
9.....	4.2	4.9	4.8	3.0	2.6	2.3	2.9	3.0
10.....	4.05	4.9	4.8	2.9	2.5	2.2	2.9	3.0
11.....	4.8	5.2	4.4	2.9	2.5	2.2	3.0	3.0
12.....	5.1	5.2	4.4	2.8	2.5	2.2	3.0	3.0
13.....	5.0	5.2	4.4	2.8	2.5	2.2	3.0	3.0
14.....	4.5	5.2	4.4	2.8	2.5	2.2	3.0	3.0
15.....	4.4	5.2	4.5	2.7	2.4	2.2	3.0	2.0
16.....	4.3	5.1	4.3	2.7	2.4	2.3	3.0	3.0
17.....	4.2	5.1	4.2	2.7	2.4	2.3	3.0	2.9
18.....	4.2	5.0	4.2	2.8	2.4	2.3	2.9	2.9
19.....	4.3	5.1	4.1	2.8	2.4	2.6	2.9	2.9
20.....	4.4	5.1	4.0	2.8	2.3	2.7	2.9	2.9
21.....	4.3	5.3	3.9	2.8	2.3	2.7	2.9	2.9
22.....	4.3	5.7	3.8	2.8	2.3	2.7	2.9	2.9
23.....	4.4	6.1	3.6	2.7	2.3	2.8	2.9	2.9
24.....	4.4	6.1	3.4	2.7	2.3	2.8	2.9	2.8
25.....	4.6	6.1	3.0	2.7	2.3	2.9	2.9	2.8
26.....	5.0	6.3	2.9	2.7	2.3	2.9	2.9
27.....	5.1	6.2	2.9	2.6	2.3	3.0	3.0
28.....	4.9	6.2	2.8	2.6	2.2	3.0	3.0
29.....	4.8	6.2	2.8	2.6	2.2	3.0	3.0
30.....	4.8	6.2	2.6	2.6	2.2	3.0	3.1
31.....		6.0	2.4	2.2	3.1

Daily discharge, in second-feet, of Flat Willow Creek near Flat Willow, Mont., for 1912.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1.....		115	218	14	7	2.5	26	35
2.....		121	210	14	7	2.5	22	35
3.....		128	172	50	7	1.0	18	35
4.....		128	168	50	10	1.0	18	35
5.....		128	160	45	10	2.5	22	30
6.....		128	146	35	14	2.5	22	30
7.....		128	139	35	14	2.5	22	30
8.....		121	132	35	18	4.5	22	30
9.....	79	121	132	30	14	4.5	26	30
10.....	70	121	132	26	10	2.5	26	30
11.....	115	142	106	26	10	2.5	30	30
12.....	135	142	106	22	10	2.5	30	30
13.....	128	142	106	22	10	2.5	30	30
14.....	97	142	106	22	10	2.5	30	30
15.....	91	142	112	18	7	2.5	30	30
16.....	85	185	100	18	7	4.5	30	30
17.....	79	135	94	18	7	4.5	30	26
18.....	79	128	94	22	7	4.5	26	26
19.....	85	135	88	22	7	14	26	26
20.....	91	135	82	22	4.5	18	26	26
21.....	85	149	76	22	4.5	18	26	26
22.....	85	180	70	22	4.5	18	26	26
23.....	91	210	60	18	4.5	22	26	26
24.....	91	214	50	18	4.5	22	26	22
25.....	103	214	30	18	4.5	26	26	22
26.....	128	232	26	18	4.5	26	26
27.....	135	224	26	14	4.5	30	30
28.....	121	224	22	14	2.5	30	30
29.....	115	228	22	14	2.5	30	30
30.....	115	228	14	14	2.5	30	31
31.....		214	7.0	2.5	35

NOTE.—Daily discharge determined as follows: Apr. 9 to May 21 and June 4 to Nov. 25 from two fairly well-defined rating curves. May 22 to June 3 by indirect method for shifting channel.

Monthly discharge of Flat Willow Creek near Flat Willow, Mont., for 1912.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accu- racy.
	Maximum.	Minimum.	Mean.		
April 9-30.....	135	70	100	4,360	B.
May.....	232	115	159	9,780	C.
June.....	218	14	100	5,950	B.
July.....	50	7	23.4	1,440	B.
August.....	18	2.5	7.48	460	B.
September.....	30	1.0	11.2	666	B.
October.....	35	18	26.7	1,640	B.
November 1-25.....	35	22	28.0	1,440	B.
The period.....				25,700	

MILK RIVER BASIN.**SOUTH FORK OF MILK RIVER NEAR BROWNING, MONT.**

Location.—In the SW. $\frac{1}{4}$ sec. 29, T. 37 N., R. 9 W., at Richard Croff's ranch, about 40 miles northeast of Browning, Mont., and about 6 miles south of the Canadian boundary line.

Records available.—April 28, 1905, to December 31, 1912.

Drainage area.—283 square miles.

Gage.—Overhanging chain. During the high water of June, 1908, the gage was washed out and was not replaced until July 31, 1908, when the new chain gage was installed at the original site and datum.

Channel.—Permanent.

Discharge measurements.—Made from a cable installed at the time of the installation of the new gage.

Winter flow.—Affected by ice.

Flood discharge.—The river overflows its banks at gage height of 12 feet; high-water marks show that the flood of June, 1908, reached a stage of 15.4 feet on the gage. The flood width was 850 feet and the cross section about 2,600 square feet.

Diversions.—None.

Accuracy.—Records excellent except during the winter months.

Discharge measurements of South Fork of Milk River near Browning, Mont., in 1912.

Date.	Hydrographer.	Gage height.	Dis- charge.
Aug. 24	W. A. Lamb.....	<i>Fect.</i> 2.51	<i>Sec.-ft.</i> 22
Nov. 15do.....	2.81	55

Daily gage height, in feet, of South Fork of Milk River near Browning, Mont., for 1912.

[R. J. Croff, observer.]

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1.....	3.35	3.25	3.33	2.65	2.47	2.7	2.35	2.7
2.....	5.3	3.3	3.17	3.33	2.73	2.50	2.75	2.6	2.6
3.....	4.5	3.4	3.15	3.30	2.85	2.55	2.75	2.55	2.65
4.....	4.5	3.4	3.1	3.07	3.0	2.6	2.85	2.35	2.6
5.....	4.5	3.35	3.1	2.93	3.0	2.7	2.75	2.55	2.6
6.....	3.95	3.35	3.1	2.85	2.85	2.75	2.75	2.65	2.6
7.....	3.6	3.3	3.1	2.80	2.75	2.73	2.75	2.4	2.6
8.....	3.95	3.35	3.10	2.93	2.7	2.70	2.75	2.45	2.6
9.....	4.15	3.6	3.07	3.03	2.65	2.65	2.85	2.55	2.6
10.....	4.15	3.45	3.03	3.10	2.65	2.60	2.75	3.0

Daily gage height, in feet, of South Fork of Milk River near Browning, Mont., for 1912—
Continued.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
11.....	4.1	3.35	2.97	3.03	2.63	2.57	2.75	2.8
12.....	4.15	3.35	2.95	2.93	2.60	2.55	2.85	2.95
13.....	3.65	3.27	2.95	2.95	2.60	2.5	2.75	2.85
14.....	3.4	3.25	3.0	2.93	2.57	2.5	2.75	2.65
15.....	3.35	3.33	2.95	2.87	2.55	2.45	2.75	2.62
16.....	3.35	3.30	3.0	2.85	2.75	2.45	2.75	2.70
17.....	3.4	3.37	3.05	2.80	2.85	2.45	2.75	2.6
18.....	3.5	3.33	2.95	2.83	2.75	2.50	2.75	2.75
19.....	3.55	3.25	2.93	2.83	2.7	2.53	2.75	2.6
20.....	3.45	3.5	2.90	3.03	2.65	2.57	2.75	2.5
21.....	3.4	5.1	2.87	3.47	2.63	2.60	2.55	2.75
22.....	3.35	5.4	2.80	3.25	2.60	2.65	2.65	2.9
23.....	3.4	4.35	2.85	3.25	2.57	2.73	2.45	3.0
24.....	3.45	3.85	2.80	3.20	2.55	2.75	2.45	2.9
25.....	3.4	3.65	2.77	3.13	2.53	2.77	2.85	2.5
26.....	3.4	3.55	2.75	3.00	2.50	2.77	2.75	2.5
27.....	3.35	3.5	2.73	2.87	2.5	2.75	2.7	2.45
28.....	3.35	3.45	2.70	2.77	2.5	2.8	2.6	2.5
29.....	3.3	3.37	2.75	2.75	2.45	2.75	2.75	4.7
30.....	3.35	3.35	3.0	2.7	2.45	2.7	2.65	2.7
31.....	3.3	2.65	2.45	2.7

NOTE.—Apr. 1, relation of gage height to discharge probably affected by ice.

Daily discharge, in second-feet, of South Fork of Milk River near Browning, Mont., for 1912.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1.....	445	144	124	140	36	18	42	9	42
2.....	445	134	110	140	46	20	48	31	31
3.....	445	154	106	134	60	26	48	26	36
4.....	445	154	97	92	81	31	60	9	31
5.....	445	144	97	71	81	42	48	26	31
6.....	286	144	97	60	60	48	48	36	31
7.....	195	134	97	54	48	46	48	12	31
8.....	286	144	97	71	42	42	48	16	31
9.....	342	195	92	86	36	36	60	26	31
10.....	342	164	86	97	36	31	48	81
11.....	328	144	77	86	34	28	48	54
12.....	342	144	74	71	31	26	60	74
13.....	208	128	74	74	31	20	48	60
14.....	154	124	81	71	28	20	48	36
15.....	144	140	74	63	26	16	48	33
16.....	144	134	81	60	48	16	48	42
17.....	154	148	89	54	60	16	48	31
18.....	174	140	74	58	48	20	48	48
19.....	184	124	71	58	42	23	48	31
20.....	164	174	67	86	36	28	48	20
21.....	154	632	63	168	34	31	26	48
22.....	144	731	54	124	31	36	36	67
23.....	154	400	60	124	28	46	16	81
24.....	164	260	54	115	26	48	16	67
25.....	154	208	50	102	23	50	60	20
26.....	154	184	48	81	20	50	48	20
27.....	144	174	46	63	20	48	42	16
28.....	144	164	42	50	20	54	31	20
29.....	134	148	48	48	16	48	48	42
30.....	144	144	81	42	16	42	36	42
31.....	134	36	16	42

NOTE.—Daily discharge determined from a well-defined rating curve. Apr. 1 and 2, discharge estimated.

Monthly discharge of South Fork of Milk River near Browning, Mont., for 1912.

[Drainage area, 283 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accu- racy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
April.....	445	134	239	0.845	0.94	14,200	A.
May.....	731	124	196	.693	.80	12,100	A.
June.....	124	42	77.0	.272	.30	4,580	A.
July.....	168	36	83.2	.294	.34	5,120	A.
August.....	81	16	37.4	.132	.15	2,300	A.
September.....	54	16	33.5	.118	.13	1,990	A.
October.....	60	16	44.9	.159	.18	2,780	A.
November.....	81	9	37.5	.133	.15	2,230	A.
December 1-9.....	42	31	32.8	.116	.04	586	A.
The period.....						45,900	

MILK RIVER AT HAVRE, MONT.

Location.—In SE. $\frac{1}{4}$ SE. $\frac{1}{4}$ sec. 5, T. 32 N., R. 16 E., at the highway bridge over Milk River at Havre, Mont.

Records available.—May 15, 1898, to December 31, 1912.

Drainage area.—Not accurately known.

Gage.—Chain fastened to bridge rail on the downstream side; datum unchanged.

Channel.—Shifts.

Discharge measurements.—Made from bridge or by wading.

Winter flow.—From the last part of November to the first part of April the river at Havre is frozen entirely over and in portions of the cross sections it is usually frozen to the bottom.

Diversions.—An irrigation company in southern Alberta, Canada, has been granted an appropriation of 500 second-feet of the low-water flow and 1,500 second-feet of the high-water flow, and a canal of 330 second-feet capacity has been partially constructed but no water has been diverted. There are no other important irrigation rights above Havre, but farther downstream are five large canal systems supplied directly from Milk River and irrigating about 22,000 acres. Preliminary steps toward the adjudication of the water rights of these various systems have been taken. A suit in behalf of the Fort Belknap Indians was decided in their favor with the result that they were given a prior right over the other canals to 125 second-feet, the priority of the other rights not being touched upon. Although no provision for storage has been made by the above claimants, the entire unappropriated flow of the stream has been filed upon by the United States Reclamation Service in connection with its Milk River irrigation project, now under construction.

Accuracy.—Frequent discharge measurements are necessary to properly define the rating curve, and even with these the estimates are subject to considerable error. In years of low precipitation the flow ceases entirely and the water stands in pools for several months.

Discharge measurements of Milk River at Havre, Mont., in 1912.

Date.	Hydrographer.	Gage height.	Dis- charge.	Date.	Hydrographer.	Gage height.	Dis- charge.
		<i>Feet.</i>	<i>Sec.-ft.</i>			<i>Feet.</i>	<i>Sec.-ft.</i>
Apr. 3	W. A. Lamb.....	11.96	4,860	July 24	R. R. Randell.....	5.92	106
May 16	R. R. Randell.....	6.57	398	Aug. 26do.....	5.50	48
June 13do.....	6.07	205	Nov. 11do.....	6.01	123
July 8do.....	5.88	117				

Daily gage height, in feet, of Milk River at Havre, Mont., for 1912.

[C. W. Ling, observer.]

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1.		11.1	6.9	6.8	5.7	5.9	5.4	5.9	5.9
2.		11.3	7.0	6.7	5.8	5.9	5.4	5.9	5.9
3.		11.4	7.1	6.6	5.7	5.9	5.4	5.9	5.9
4.		10.7	7.0	6.5	5.8	5.9	5.4	5.9	5.9
5.		10.0	6.5	6.5	5.6	5.9	5.4	5.9	5.9
6.		9.2	6.8	6.5	5.7	5.8	5.3	5.8	5.9
7.		9.1	6.8	6.5	5.6	5.8	5.3	5.8	5.9
8.		8.7	6.7	6.4	5.7	5.8	5.3	5.8	5.9
9.		8.2	6.7	6.3	6.0	5.8	5.3	5.8	5.8
10.		7.7	6.6	6.3	6.0	5.8	5.6	5.8	5.8
11.		8.0	6.6	6.1	6.0	5.8	5.6	5.8	6.0
12.		8.0	6.6	6.2	5.9	5.6	5.5	6.0	5.9
13.		8.2	6.6	6.0	5.9	5.6	5.6	6.0	5.9
14.		8.1	6.4	6.1	5.9	5.5	5.6	6.0	5.9
15.		7.9	6.5	6.0	5.9	5.5	5.6	6.0	5.9
16.		7.8	6.6	6.1	5.9	5.5	5.6	6.0	5.9
17.		7.5	6.6	6.2	5.9	5.7	5.6	5.9	5.9
18.		7.5	6.3	6.2	5.9	5.8	5.6	5.9	5.8
19.		7.2	6.4	6.1	5.9	5.8	5.6	6.0	6.0
20.		7.2	6.4	6.1	5.8	6.2	5.6	6.0	5.9
21.		7.3	6.3	5.9	5.8	6.1	5.6	6.0	5.9
22.		7.3	6.2	6.0	5.8	5.8	5.6	5.9	5.9
23.		7.0	6.3	5.8	5.9	5.7	5.6	5.9	5.9
24.	7.3	7.1	6.4	5.9	5.9	5.6	6.0	5.9	5.9
25.	8.5	7.0	6.4	5.8	5.9	5.6	6.1	5.9	5.9
26.	11.0	7.1	7.0	5.9	5.9	5.5	6.1	5.9	5.9
27.	11.7	6.9	7.6	5.7	5.8	5.5	6.1	5.9	5.9
28.	12.7	6.9	7.3	5.8	5.8	5.5	6.2	5.9	5.6
29.	14.5	6.9	7.1	5.7	6.1	5.5	6.2	5.9	5.5
30.	11.3	6.8	7.0	5.8	6.0	5.5	6.2	5.9	5.5
31.	10.0		6.9		5.9	5.4		5.9	

Daily discharge, in second-feet, of Milk River at Havre, Mont., for 1912.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1.		3,960	545	500	110	102	40	102	102
2.		4,170	590	460	120	102	40	102	102
3.		4,280	640	420	110	102	40	102	102
4.		3,540	590	380	120	102	40	102	102
5.		2,830	380	380	100	102	40	102	102
6.		2,100	500	380	110	85	34	85	102
7.		2,020	500	380	100	85	34	85	102
8.		1,690	460	340	110	85	34	85	102
9.		1,310	460	300	150	85	34	85	85
10.		980	420	300	150	85	58	85	85
11.		1,170	420	230	150	85	58	85	122
12.		1,170	420	265	120	58	48	122	102
13.		1,310	420	200	120	58	58	122	102
14.		1,240	340	200	120	48	58	122	102
15.		1,100	380	170	120	48	58	122	102
16.		1,040	420	200	120	48	58	122	102
17.		860	420	240	119	70	58	102	102
18.		860	300	240	118	85	58	102	85
19.		690	340	200	116	85	58	122	122
20.		690	340	200	112	170	58	122	102
21.		745	300	150	110	145	58	122	102
22.		745	265	170	110	85	58	102	102
23.		590	300	130	102	70	58	102	102
24.	745	640	340	140	102	58	122	102	102
25.	1,530	590	340	120	102	58	145	102	102
26.	3,850	640	590	140	102	48	145	102	102
27.	4,610	545	920	110	85	48	145	102	102
28.	5,710	545	745	120	85	48	170	102	58
29.	7,790	545	640	110	145	48	170	102	48
30.	4,170	500	590	120	122	48	170	102	48
31.	2,830		545		102	40		102	

NOTE.—Daily discharge determined as follows: Mar. 24 to June 13 from a fairly well defined rating curve; June 14 to July 23 by indirect method for shifting channel; July 24 to Nov. 30 from a well defined rating curve.

Monthly discharge of Milk River at Havre, Mont., for 1912.

[Drainage area, 5,050 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
March 24-31.....	7,790	745	3,900	0.772	0.23	61,900	B.
April.....	4,280	500	1,440	.285	.32	85,700	B.
May.....	920	265	466	.092	.11	28,700	B.
June.....	500	110	243	.048	.05	14,500	B.
July.....	150	85	115	.023	.03	7,070	B.
August.....	170	40	77.0	.015	.02	4,740	A.
September.....	170	34	73.5	.015	.02	4,370	A.
October.....	122	85	104	.021	.02	6,400	A.
November.....	122	48	96.6	.019	.02	5,750	A.
The period.....						219,000	

NOTE.—Taken from the U. S. Reclamation Service Eleventh Annual Report; supersedes the value of 7,300 square miles previously used.

MILK RIVER AT MALTA, MONT.

Location.—In the NW. $\frac{1}{4}$ sec. 17, T. 30 N., R. 30 E., at the old highway bridge at Malta, Mont.

Records available.—July 31, 1902, to December 31, 1912.

Drainage area.—Not accurately known.

Gage.—Chain fastened to handrail on downstream side of bridge; datum unchanged.

Channel.—Sandy; shifts during floods.

Discharge measurements.—Made from bridge or by wading.

Winter flow.—More or less ice present during winter months.

Diversions.—The entire run-off from the drainage area above does not pass the station, for between Havre and Malta seven irrigation canals, which irrigate about 25,000 acres of land, divert water from Milk River and its tributaries. The United States Reclamation Service has constructed a diversion dam at Dodson, about 17 miles above the station, which will eventually divert water for the irrigation of about 108,000 acres of land in Milk River valley. East of Malta there are nearing completion two canals, one on each side, the combined discharge being 1,000 second-feet.

Discharge measurements of Milk River at Malta, Mont., in 1912.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		<i>Feet.</i>	<i>Sec.-ft.</i>			<i>Feet.</i>	<i>Sec.-ft.</i>
Apr. 2	W. A. Lamb.....	a 17.4	5,830	May 20.	R. R. Randell.....	3.08	726
4	do.....	b 15.88	7,020	June 17	do.....	2.89	594
6	B. E. Jones.....	16.58	9,120	July 28	do.....	1.81	168
18	do.....	c 10.09	5,040	Aug. 30	do.....	1.91	192
29	do.....	4.15	1,260	Nov. 15	do.....	1.88	172

a Ice present.

b Floating ice, but ought not to affect gage height.

c Used cross-section obtained on Apr. 6, 1912, for obtaining depths of observations; and cross-section of Apr. 29 in computing area.

Daily gage height, in feet, of Milk River at Malta, Mont., for 1912.

[A. N. Jones, observer.]

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1.....		15.7	4.1	4.5	2.1	1.75	2.1	2.0	1.7
2.....		17.4	4.0	4.3	2.05	1.9	1.9	1.8
3.....		17.1	3.7	4.1	2.0	1.75	1.7	1.95	1.8
4.....		15.9	3.8	4.2	3.25	1.75	2.0	1.8
5.....		16.2	4.0	3.7	2.6	1.7	1.7	2.0	1.7
6.....		16.5	4.4	3.7	2.4	1.75	1.95	1.65
7.....		16.5	6.6	3.4	2.85	1.8	1.85	1.9	1.65
8.....		16.5	5.2	3.2	2.6	1.75	1.9	1.6
9.....		16.4	4.8	3.05	2.6	1.75	1.7	2.0	1.6
10.....		16.4	4.4	3.25	2.5	1.75	2.0	1.6
11.....		16.5	4.1	3.05	2.3	1.75	1.8	2.0	1.6
12.....		16.5	3.8	2.9	2.0	1.8	1.95	1.6
13.....		16.7	3.8	2.6	1.95	1.75	1.7	2.1	1.6
14.....		16.8	3.9	2.65	1.7	1.95	1.6
15.....		14.6	3.7	2.65	1.7	1.75	1.7	1.95
16.....		11.8	3.6	2.75	1.8	1.6	1.9
17.....		11.0	2.85	3.05	1.9	1.75	1.9
18.....		10.1	2.8	3.2	1.9	1.65	1.9
19.....		9.5	3.35	3.5	1.9	1.85	1.95
20.....		7.6	3.1	3.35	1.8	2.25	1.6	2.0	1.5
21.....		6.3	3.25	3.0	1.8	2.0	1.5
22.....		5.3	3.3	2.9	1.85	2.5	1.7	2.0	1.5
23.....		4.9	3.3	2.7	1.9	2.0
24.....		4.7	3.4	2.5	1.9	2.3	1.7	1.9	1.5
25.....		4.4	3.5	2.45	1.85	2.0
26.....		4.2	3.5	2.5	1.9	2.2	1.7	2.05	1.5
27.....		4.2	3.4	2.45	1.9	1.9
28.....	13.5	4.1	3.5	2.25	1.8	2.2	1.75	2.1	1.5
29.....	15.1	4.2	4.5	2.2	1.8	1.7
30.....	13.6	4.0	5.0	2.05	1.75	1.9	1.9	2.0	1.4
31.....	13.5	5.1	1.7	2.1	1.4

NOTE.—Relation of gage height to discharge, Mar. 28 to Apr. 4 and Dec. 1 to 31 probably affected by ice.

Daily discharge, in second-feet, of Milk River at Malta, Mont., for 1912.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1.....	5,500	1,340	1,620	255	148	255	190	220
2.....	5,830	1,280	1,480	238	190	195	190	212
3.....	6,000	1,070	1,340	220	148	135	205	205
4.....	7,020	1,140	1,410	780	148	135	220	212
5.....	8,930	1,280	1,070	450	135	135	212	220
6.....	9,120	1,540	1,070	365	148	155	205	205
7.....	9,120	3,060	870	565	180	175	198	190
8.....	9,120	2,100	750	450	148	155	190	205
9.....	9,060	1,820	668	450	148	135	205	220
10.....	9,060	1,540	780	405	148	148	220	220
11.....	9,120	1,340	668	325	148	160	212	220
12.....	9,120	1,140	590	220	160	148	205	238
13.....	9,260	1,140	450	205	148	135	205	255
14.....	9,320	1,210	472	135	148	135	205	230
15.....	7,890	1,070	472	135	148	135	198	205
16.....	6,180	1,000	518	160	148	110	190	198
17.....	5,700	565	668	190	148	116	190	190
18.....	5,160	540	750	190	162	122	190	198
19.....	4,820	840	935	190	175	116	205	205
20.....	3,680	695	840	160	308	110	220	212
21.....	2,860	780	640	160	356	122	220	220
22.....	2,180	810	590	175	405	135	220	220
23.....	1,900	810	495	190	365	135	205	220
24.....	1,760	870	405	190	325	135	190	220
25.....	1,540	935	385	175	308	135	214	220
26.....	1,410	935	405	190	290	135	238	205
27.....	1,410	870	385	190	290	142	246	190
28.....	1,340	935	308	160	290	148	255	162
29.....	1,410	1,620	290	160	240	169	238	135
30.....	1,280	1,960	238	148	190	190	220	135
31.....	2,040	135	255	220

NOTE.—Daily discharge determined from a well-defined rating curve. Daily discharge estimated Apr. 1 to 4. Discharge interpolated for days for which gage heights are missing.

Monthly discharge of Milk River at Malta, Mont., for 1912.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accu- racy.
	Maximum.	Minimum.	Mean.		
April.....	9,320	1,280	5,540	330,000	A.
May.....	3,060	540	1,230	75,600	A.
June.....	1,620	238	719	42,800	A.
July.....	780	135	257	15,800	A.
August.....	405	135	211	13,000	A.
September.....	255	110	145	8,630	A.
October.....	255	190	210	12,900	A.
November.....	255	135	206	12,300	A.
The period.....				511,000	

MILK RIVER AT HINSDALE, MONT.

Location.—In the NE. $\frac{1}{4}$ SW. $\frac{1}{4}$ sec. 33, T. 31 N., R. 36 E. At the highway bridge over Milk River, about 1 mile from Hinsdale, Mont., a point 46 miles from the junction of Milk River with the Missouri.

Records available.—May 13, 1908, to December 31, 1912.

Drainage area.—Not measured.

Gage.—Chain fastened to upstream side of highway bridge; datum unchanged.

Discharge measurements.—Made from bridge or by wading.

Winter flow.—Stream frozen entirely across and to a considerable depth from late in November until the first of April.

Diversions.—No water is diverted between the station at Hinsdale and that at Malta. The flow of the stream has, however, been appropriated by the United States Reclamation Service in connection with the Milk River project, and will be diverted at a point 9 miles east of Hinsdale to irrigate land in lower Milk River valley.

Discharge measurements of Milk River at Hinsdale, Mont., in 1912.

Date.	Hydrographer.	Gage height.	Dis-charge.	Date.	Hydrographer.	Gage height.	Dis-charge.
		<i>Feet.</i>	<i>Sec.-ft.</i>			<i>Feet.</i>	<i>Sec.-ft.</i>
Apr. 21	B. E. Jones.....	14.15	8,940	June 18	R. R. Randell.....	5.39	1,780
26	do.....	6.98	2,920	July 29	do.....	2.70	272
May 5	do.....	5.48	1,940	Aug. 31	do.....	3.45	627
10	do.....	10.45	5,730	Nov. 14	do.....	2.72	315
25	R. R. Randell.....	5.85	2,130				

Daily gage height, in feet, of Milk River at Hinsdale, Mont., for 1912.

[Goldie Wooldridge, observer.]

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1.....	12.3	5.7	6.8	3.5	2.55	3.35	2.8	2.7
2.....	17.9	5.6	6.7	3.2	2.5	3.15	2.55	2.65
3.....	23.3	5.5	6.3	3.0	2.5	3.0	2.8	2.7
4.....	24.6	5.7	5.9	3.2	2.45	2.75	2.75	2.65
5.....		6.3	5.8	2.95	2.4	4.3	2.6	2.65
6.....		7.1	5.3	2.95	2.4	3.9	2.6	2.7
7.....		8.4	5.2	2.95	2.35	3.55	2.75	2.65
8.....		10.8	4.9	4.1	2.35	3.15	2.7	2.7
9.....		11.3	4.7	4.8		3.0	2.95	2.65
10.....		10.4	4.6	4.7		2.9	2.65	2.65

Daily gage height, in feet, of Milk River at Hinsdale, Mont., for 1912—Continued.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
11.....		7.8	4.6	4.6	-----	2.9	2.7	2.7
12.....		7.7	7.2	4.4	-----	2.85	2.55	2.65
13.....		7.2	7.3	4.1	2.35	2.8	2.6	2.7
14.....		6.6	7.1	4.2	-----	2.6	2.55	2.55
15.....		6.3	6.6	3.7	-----	2.5	2.55	2.75
16.....		5.7	6.0	3.4	-----	2.45	2.6	2.75
17.....		5.4	5.3	3.2	-----	2.35	2.75	-----
18.....	22.9	5.4	5.4	3.2	-----	2.4	2.7	-----
19.....	19.3	5.2	5.0	3.1	-----	2.4	2.55	-----
20.....	15.5	5.2	4.6	3.1	-----	2.35	2.55	-----
21.....	14.1	4.9	4.5	3.0	8.1	2.4	2.6	-----
22.....	12.5	4.8	4.4	3.0	-----	2.35	2.55	-----
23.....	10.3	4.8	4.3	3.0	-----	2.4	2.8	-----
24.....	9.1	6.5	4.3	2.95	-----	2.35	2.65	-----
25.....	8.2	5.9	4.3	2.9	-----	2.4	2.65	-----
26.....	7.0	5.8	4.2	3.1	-----	2.4	2.7	-----
27.....	6.3	5.8	4.2	2.95	-----	2.35	2.65	-----
28.....	6.3	12.8	3.8	2.8	-----	2.4	2.7	-----
29.....	6.2	15.1	3.6	2.7	-----	2.4	2.65	-----
30.....	6.0	10.9	3.4	2.7	3.5	2.35	2.65	-----
31.....		7.8	-----	2.6	3.45	-----	2.7	-----

Daily discharge, in second-feet, of Milk River at Hinsdale, Mont., for 1912.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1.....	6,000	2,020	2,790	655	240	575	320	285
2.....	7,000	1,950	2,720	500	225	475	240	270
3.....	8,000	1,880	2,440	405	225	405	320	285
4.....	9,000	2,020	2,160	500	212	302	302	270
5.....	16,000	2,440	2,090	382	200	1,120	255	270
6.....	24,200	3,000	1,760	382	200	880	255	285
7.....	23,900	3,930	1,690	382	188	682	302	270
8.....	23,600	5,920	1,500	1,000	188	475	285	285
9.....	22,300	6,370	1,360	1,430	188	405	382	270
10.....	21,000	5,560	1,300	1,360	188	360	270	270
11.....	20,900	3,490	1,300	1,300	188	360	285	285
12.....	20,600	3,420	3,070	1,180	188	340	240	270
13.....	20,300	3,070	3,140	1,000	188	320	255	285
14.....	20,000	2,650	3,000	1,060	190	255	240	240
15.....	19,700	2,440	2,650	765	190	225	240	302
16.....	19,400	2,020	2,230	600	190	212	255	302
17.....	19,100	1,820	1,760	500	190	188	302	-----
18.....	18,800	1,820	1,820	500	190	200	285	-----
19.....	14,600	1,690	1,560	450	200	200	240	-----
20.....	10,400	1,690	1,300	450	3,000	188	240	-----
21.....	9,000	1,500	1,240	405	3,700	200	255	-----
22.....	7,480	1,430	1,180	405	3,500	188	240	-----
23.....	5,470	1,430	1,120	405	3,000	200	320	-----
24.....	4,480	2,580	1,120	382	2,500	188	270	-----
25.....	3,780	2,160	1,120	360	2,000	200	270	-----
26.....	2,930	2,090	1,060	450	1,500	200	285	-----
27.....	2,440	2,090	1,060	382	1,000	188	270	-----
28.....	2,440	7,760	820	320	1,000	200	285	-----
29.....	2,370	10,000	710	285	1,000	200	270	-----
30.....	2,230	6,010	600	285	655	188	270	-----
31.....		3,490	-----	255	628	-----	285	-----

NOTE.—Daily discharge determined from a rating curve well defined below gage height 14 feet, and fairly well defined from 14 to 30 feet. Discharge, Apr. 5-17, estimated from the high-water mark, which was referred to the gage datum by leveling the date of the highest water having been observed by the hydrographer; also from a current meter measurement at Vandalia, 6 miles below Hinsdale on Apr. 10. Daily discharge estimated Aug. 9-12, 14-20, and 22-29. Discharge estimated Nov. 17-30 at 250 second-feet.

Monthly discharge of Milk River at Hinsdale, Mont., for 1912.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accu- racy.
	Maximum.	Minimum.	Mean.		
April.....	24,200	2,230	12,900	768,000	C.
May.....	10,000	1,430	3,220	198,000	A.
June.....	3,140	600	1,720	102,000	A.
July.....	1,430	255	604	37,100	A.
August.....	3,700	188	879	54,000	C.
September.....	1,120	188	337	20,100	A.
October.....	382	240	275	16,900	A.
November.....			265	15,800	C.
The period.....				1,210,000	

NORTH FORK OF MILK RIVER NEAR BROWNING, MONT.

Location.—At Alexander Dubray's ranch, 35 miles north of Browning, and about 2 miles south of the Canadian boundary line.

Records available.—May 8, 1911, to July 6, 1912.

Drainage area.—Not measured.

Gage.—Staff gage nailed to a post on right bank.

Channel.—Liable to shift.

Discharge measurements.—Made by wading at convenient sections near the gage.

Winter flow.—Stream freezes over during the winter; winter gage heights have no value.

Accuracy.—Results are only fair.

Discharge measurements of North Fork of Milk River near Browning, Mont., in 1911 and 1912.

Date.	Hydrographer.	Gage height.	Dis-charge.	Date.	Hydrographer.	Gage height.	Dis-charge.
1911.		<i>Feet.</i>	<i>Sec.-ft.</i>	1911.		<i>Feet.</i>	<i>Sec.-ft.</i>
May 8	B. E. Jones.....	4.93	31	Aug. 28	B. E. Jones.....	4.74	20
9	do.....	4.97	34				
June 8	do.....	4.87	30	1912.			
25	W. A. Lamb.....	5.12	54	June 8	R. R. Randell.....	4.51	25

Daily gage height, in feet, of North Fork of Milk River near Browning, Mont., for 1911.

[B. F. Lowry, observer.]

Day.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Day.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1....		5.00	5.00	4.85	4.50	4.90	4.90	16....	5.35	4.80	4.60	4.60	4.90	4.90
2....		4.95	4.90	4.85	4.55	4.90	4.90	17....	5.00	4.80	4.70	4.60	4.90	4.90
3....		4.95	4.90	4.85	5.10	4.90	4.90	18....	5.10	4.80	4.75	4.60	4.90	4.90
4....		4.90	4.90	4.85	5.45	4.90	4.90	19....	5.00	4.80	4.75	4.55	4.90	4.90
5....		4.90	4.85	4.93	6.90	4.90	4.90	20....	4.95	4.80	4.80	4.55	4.90	4.90
6....		4.95	4.85	4.90	6.90	4.90	4.90	21....	4.95	4.80	4.80	4.55	5.10	4.90
7....		4.90	4.70	4.95	6.85	4.90	4.90	22....	4.95	4.85	4.80	4.50	5.10	4.90
8....	4.95	4.85	4.70	4.95	6.80	4.90	23....	5.00	5.00	4.75	4.50	4.90	4.90
9....	5.00	4.95	4.70	5.00	5.80	4.90	24....	5.00	5.10	4.75	4.50	4.90	4.90
10....	4.93	4.80	4.70	4.95	5.75	4.90	25....	5.05	5.10	4.70	4.55	4.90	4.90
11....	4.90	4.80	4.70	4.85	5.65	4.90	26....	5.05	5.15	4.70	4.55	4.90	4.90
12....	4.95	4.80	4.65	4.70	4.90	4.90	27....	5.00	5.15	4.65	4.50	4.90	4.90
13....	5.00	4.85	4.65	4.70	4.90	4.90	28....	4.95	5.10	4.65	4.65	4.90	4.90
14....	5.10	4.80	4.60	4.70	4.90	4.90	29....	4.90	5.05	4.70	4.55	4.90	4.90
15....	6.25	4.80	4.60	4.65	4.90	4.90	30....	4.90	5.05	4.95	4.50	4.90	4.90
								31....	4.95	4.85	4.50	4.90

NOTE.—Accuracy of gage heights Aug. 15 to Sept. 2 doubtful, on account of a new man reading gage in observer's absence.

Daily discharge, in second-feet, of North Fork of Milk River near Browning, Mont., for 1911.

Day.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Day.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1....	42	42	29	6	33	33	16....	81	25	12	12	33	33
2....	38	33	29	9	33	33	17....	42	25	18	12	33	33
3....	38	33	29	52	33	33	18....	52	25	22	12	33	33
4....	38	33	29	95	33	33	19....	42	25	22	9	33	33
5....	33	29	36	347	33	33	20....	38	25	25	9	33	33
6....	38	29	33	347	33	33	21....	38	25	25	9	52	33
7....	33	18	38	338	33	33	22....	38	29	25	6	52	33
8....	32	29	18	38	329	33	23....	42	42	22	6	33	33
9....	36	38	18	42	149	33	24....	42	52	22	6	33	33
10....	30	25	18	38	141	33	25....	47	52	18	9	33	33
11....	28	25	18	29	125	33	26....	47	58	18	9	33	33
12....	32	25	15	18	33	33	27....	42	58	15	6	33	33
13....	36	29	15	18	33	33	28....	38	52	15	15	33	33
14....	46	25	12	18	33	33	29....	33	47	18	9	33	33
15....	217	25	12	15	33	33	30....	33	47	38	6	33	33
								31....	38	29	6	33

NOTE.—Daily discharge determined as follows: May 8-15 from a fairly well-defined rating curve; May 16 to Sept. 2 from a well-defined rating curve and Sept. 3 to Nov. 7 from the same curve, its applicability, however, being doubtful.

Daily gage height, in feet, and discharge, in second-feet, of North Fork of Milk River near Browning, Mont., for 1912.

[Alex. Dubray, observer.]

Day.	March.		April.		May.		June.		July.	
	Gage height.	Dis-charge.	Gage height.	Dis-charge.	Gage height.	Dis-charge.	Gage height.	Dis-charge.	Gage height.	Dis-charge.
1....	5.75	195	4.7	41	4.6	32	4.6	32
2....	5.7	186	4.7	41	4.6	32	4.6	32
3....	5.6	168	4.7	41	4.6	32	4.6	32
4....	5.6	168	4.7	41	4.6	32	4.6	32
5....	5.45	142	4.7	41	4.6	32	4.5	24
6....	5.5	150	4.7	41	4.6	32	4.45	21
7....	5.35	126	4.7	41	4.55	28
8....	5.25	110	4.7	41	4.5	24
9....	5.2	102	4.7	41	4.5	24
10....	5.15	95	4.7	41	4.5	24
11....	5.05	81	4.7	41	4.5	24
12....	4.95	68	4.7	41	4.5	24
13....	4.8	51	4.7	41	4.5	24
14....	6.5	4.75	46	4.7	41	4.5	24
15....	6.4	4.7	41	4.65	36	4.55	28
16....	6.4	4.7	41	4.6	32	4.55	28
17....	6.25	4.7	41	4.6	32	4.5	24
18....	6.25	4.75	46	4.6	32	4.5	24
19....	6.25	4.75	46	4.6	32	4.5	24
20....	6.3	4.7	41	4.85	56	4.45	21
21....	6.2	4.7	41	5.3	118	4.4	18
22....	6.2	4.7	41	4.85	56	4.4	18
23....	6.15	4.7	41	4.7	41	4.4	18
24....	6.15	4.7	41	4.7	41	4.4	18
25....	6.15	4.7	41	4.65	36	4.4	18
26....	6.15	4.7	41	4.6	32	4.4	18
27....	6.15	4.7	41	4.6	32	4.45	21
28....	6.15	4.7	41	4.6	32	4.5	24
29....	6.05	4.7	41	4.6	32	4.5	24
30....	6.05	4.7	41	4.6	32	4.6	32
31....	5.9	4.6	32

NOTE.—Gage heights Mar. 14-31 probably distorted by ice. Daily discharge determined from a rating curve fairly well defined at gage heights 4.4 feet to 4.6 feet and poorly defined for all other stages.

Monthly discharge of North Fork of Milk River at Browning, Mont., for 1911 and 1912.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accu- racy.
	Maximum.	Minimum.	Mean.		
1911.					
May 8-31.....	217	28	47.9	2,280	B.
June.....	58	25	35.4	2,110	A.
July.....	42	12	22.2	1,360	A.
August.....	42	6	18.7	1,150	C.
September.....	347	6	86.8	5,160	C.
October.....	33	33	33.0	2,030	C.
November 1-7.....	33	33	33.0	458	C.
The period.....				14,500	
1912.					
April.....	195	41	78.5	4,670	C.
May.....	118	32	41.2	2,530	C.
June.....	32	18	24.9	1,480	B.
July 1-6.....	32	21	28.8	343	B.

NORTH FORK OF MILK RIVER NEAR CHINOOK, MONT.

Location.—In sec. 3, T. 33 N., R. 19 E., at a point about $4\frac{1}{2}$ miles north of Chinook, Mont., about 7 miles above the junction of the North Fork with the main stream.

Records available.—April 22, 1905, to December 31, 1912.

Drainage area.—Not measured.

Gage.—Chain on the left bank near the house of the observer.

Channel.—Sandy and shifting.

Discharge measurements.—Made by wading or at the cable near the gage.

Winter flow.—Ice present.

Diversions.—Three canals, which divert in the aggregate about 20 second-feet, take out above the station; several small pumping plants, which supply water for irrigating the bottom land along the river valley, also operate above the station. Below the station the Matheson and Cook canals divert water for irrigating land in Milk River valley near the mouth of the North Fork. The aggregate appropriation for these canals is 78 second-feet.

Accuracy.—Results may be considered reliable, as a fair rating curve has been constructed. The greater part of the run-off occurs during floods caused by heavy rains in the spring and early summer. In the fall the channel is often dry.

Discharge measurements of North Fork of Milk River near Chinook, Mont., in 1912.

Date.	Hydrographer.	Gage height.	Dis- charge.	Date.	Hydrographer.	Gage height.	Dis- charge.
Apr. 3	W. A. Lamb.....	<i>Feet.</i> a 4.30	<i>Sec.-ft.</i> 716	June 27	R. R. Randell.....	<i>Feet.</i> 0.95	<i>Sec.-ft.</i> 27
May 18	R. R. Randell.....	1.57	105	July 26do.....	.42	4.8
June 2do.....	1.74	115	Aug. 28do.....	.58	12.2
June 14do.....	1.16	39	Nov. 12do.....	.81	26

a Ice present.

Daily gage height, in feet, of North Fork of Milk River near Chinook, Mont., for 1912.

[Mrs. R. B. Snedecor, observer.]

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1.....		2.05	1.8	1.65	0.9	0.40	0.49	0.7	0.69
2.....		2.9	1.85	1.75	.85	.42	.49	.7	.69
3.....		5.2	1.75	1.75	.82	.40	.48	.7	.69
4.....		8.5	1.8	1.55	5.20	.39	.47	.70	.69
5.....		11.2	1.8	1.5	1.85	.38	.46	.71	.69
6.....		9.9	1.75	1.46	1.36	.38	.46	.72	.69
7.....		10.7	1.75	1.45	1.12	.37	.49	.72	.69
8.....		11.9	1.7	1.43	.99	.35	.49	.72	.71
9.....		10.9	1.75	1.36	.88	.33	.49	.72	.71
10.....		9.9	1.75	1.33	.83	.30	.49	.72	.72
11.....		8.6	1.8	1.23	.80	.29	.49	.72	.72
12.....		7.0	1.75	1.15	.71		.49	.72	.78
13.....		6.1	1.8	1.15	.64		.49	.72	.79
14.....		5.8	1.75	1.17	.64		.49	.72	.74
15.....		6.3	1.65	1.31			.50	.72	.71
16.....		4.8	1.65	2.90			.50	.73	.84
17.....		3.8	1.55	2.5	.69		.58	.75	.79
18.....		3.2	1.6	1.7	.69		.55	.78	.76
19.....		2.9	1.5	1.35	.69	.56	.54	.79	.72
20.....		2.6	1.5	1.34		.72	.54	.80	.79
21.....		2.5	1.55	1.28		.86	.53	.81	.80
22.....		2.35	1.45	1.24		.79	.54	.82	.82
23.....		2.15	1.46	1.18		.75	.55	.82	.85
24.....	1.5	2.15	1.45	1.14		.72	.60	.82	.85
25.....	1.85	2.1	1.44	1.10		.63	.63	.82	.87
26.....	1.95	2.05	1.46	1.05	.42	.59	.65	.84	
27.....	2.25	2.0	1.7	.96	.42	.58	.68	.84	
28.....	2.45	1.95	1.7	.91	.40	.56	.69	.83	
29.....	2.1	1.95	1.7	.90	.43	.54	.69	.76	
30.....	2.05	1.9	1.6	.86	.42	.54	.69	.73	
31.....	1.8		1.55		.40	.50		.70	

NOTE.—Mar. 24 to Apr. 3 relation of gage height to discharge affected by ice.

Daily discharge, in second-feet, of North Fork of Milk River near Chinook, Mont., for 1912.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1.....		120	170	100	21	4.5	7.6	18	17
2.....		300	175	116	18	5.2	7.6	18	17
3.....		716	155	116	16	4.5	7.3	18	17
4.....		2,600	175	84	1,260	4.3	7.0	18	17
5.....		3,710	175	77	145	4.1	6.6	19	17
6.....		3,180	155	72	65	4.1	6.6	19	17
7.....		3,510	155	71	42	3.9	7.6	19	17
8.....		4,000	140	69	30	3.5	7.6	19	19
9.....		3,590	150	61	23	3.1	7.6	19	19
10.....		3,150	150	57	20	2.5	7.6	19	19
11.....		2,650	160	47	18	2.4	7.6	19	19
12.....		1,980	135	40	12	3.0	7.6	19	24
13.....		1,620	145	40	12	4.0	7.6	19	24
14.....		1,500	135	41	12	5.0	7.6	19	21
15.....		1,700	120	55	13	6.0	8.0	19	19
16.....		1,110	120	410	13	7.0	8.0	20	23
17.....		757	100	295	14	8	11.2	22	24
18.....		560	110	107	14	9	10.0	24	22
19.....		471	95	60	14	10	9.6	24	19
20.....		385	95	58	12	19	9.6	25	24
21.....		357	100	52	10	30	9.2	26	25
22.....		310	80	48	9	24	9.6	27	27
23.....		260	80	42	8	22	10	27	29
24.....		260	80	39	7	19	12	27	29
25.....		250	80	35	6.0	14	14	27	31
26.....		225	80	31	5.2	12	15	28	
27.....		210	110	25	5.2	11	17	28	
28.....		200	110	22	4.5	10	17	27	
29.....		200	110	21	5.6	10	17	27	
30.....		190	95	19	5.2	10	17	20	
31.....			85		4.5	8.0		18	

NOTE.—Daily discharge determined as follows: Apr. 4 to May 31 for gage heights below 4 feet by shifting-channel methods and above 4 feet from the curve for 1911, which was well defined for gage heights in 1911 and probably fairly well defined for gage heights in 1912 above 4 feet; June 1 to July 4 and July 26 to Nov. 25 from two fairly well defined curves and July 5-25 by shifting-channel methods. Daily discharge estimated Apr. 1 and 2. Discharge for Apr. 3 is the result of a current-meter measurement.

Monthly discharge of North Fork of Milk River near Chinook, Mont., for 1912.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accu- racy.
	Maximum.	Minimum.	Mean.		
April.....	4,000	120	1,340	79,700	C.
May.....	175	89	123	7,560	C.
June.....	410	19	77.0	4,580	B.
July.....	1,260	4.5	59.5	3,660	C.
August.....	30	2.4	9.13	561	B.
September.....	17	6.6	9.92	590	B.
October.....	28	18	21.7	1,330	B.
November.....	31	17	21.5	1,070	B.
The period.....				99,100	

BEAVER CREEK NEAR SACO,¹ MONT.

Location.—In sec. 35, T. 31 N., R. 32 E., at Craig's ranch, 3 miles south of Ashfield, Mont., near Saco, the nearest post office, and about 18 miles from Malta.

Records available.—July 5, 1903, to November 13, 1912.

Drainage area.—Not measured.

Gage.—Overhanging chain. The gage was first established at bridge No. 455 of the Great Northern Railway, half a mile west of Ashfield; it was moved to its present location, $2\frac{1}{2}$ miles farther upstream, December 31, 1903.

Channel.—The stream carries little water except at the times of the spring floods or heavy rains; during the summer months the channel is obstructed by a dense growth of weeds and willows, which have to be cleared out occasionally. At medium and high stages a second channel, known as Beaver Creek Overflow, receives the stream above the station, fills a depression to the west of the main channel, and reenters at a point some distance below the gage.

Discharge measurements.—Made from a cable or by wading.

Winter flow.—Ice present during the winter months.

Diversions.—Water is diverted from Beaver Creek by small ditches leading from the stream and by small pumping plants near the banks.

Accuracy.—Results are only fair, as the growth of weeds and willows in the channel makes the construction of a permanent rating curve difficult.

Discharge measurements of Beaver Creek near Saco, Mont., in 1912.

Date.	Hydrographer.	Gage height.	Dis- charge.	Date.	Hydrographer.	Gage height.	Dis- charge.
Apr. 27	B. E. Jones.....	<i>Feet.</i> 2.85	<i>Sec.-ft.</i> 57	July 27	R. R. Randell.....	<i>Feet.</i> 1.30	<i>Sec.-ft.</i> 1.6
May 8do.....	10.62	716	Aug. 29do.....	4.70	146
May 23	R. R. Randell.....	2.70	50	Sept. 8do.....	3.43	80
June 16do.....	1.60	6.8	Nov. 13do.....	1.66	9.1

¹ Station described in earlier reports as "Beaver Creek near Ashfield, Mont."

Daily gage height, in feet, of Beaver Creek near Saco, Mont., for 1912.

[Mrs. W. P. Craig, observer.]

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1		1.95	3.6	1.23	1.66	3.25	1.42	1.8
2		1.9	3.4	1.43	1.66	2.85	1.42	1.8
3		2.0	3.25	1.62	1.66	2.5	1.42	1.8
4		2.2	2.9	2.27	1.70	2.6	1.42	1.7
5			2.65	3.30	1.75	2.85	1.42	1.70
6			2.6	5.1	1.75	3.4	1.51	1.69
7	7.4		2.55	8.7	1.75	3.6	1.51	1.69
8	6.4	10.6	2.24	8.8	1.65	3.5	1.51	1.69
9	4.8		2.14	9.2	1.55	3.1	1.51	1.69
10	3.6		1.94	10.2	1.55	2.70	1.61	
11	3.15		1.84	9.4	1.65	2.08	1.61	
12	2.9	6.0	1.74	8.1	1.65	1.88	1.61	
13	2.65	6.8	1.69	6.7	1.65	1.68	1.61	1.66
14	2.8	5.5	1.64	5.6	1.65	1.53	1.61	
15	2.6	4.9	1.59	4.5	1.65	1.53	1.71	
16	3.1	4.3	1.59	3.9	1.75	1.53	1.71	
17	4.0	3.9	2.18	3.3	1.75	1.53	1.76	
18	5.0	3.3	3.00	2.75	1.9	1.53	2.01	
19	5.1	3.05	3.5	2.40	2.5	1.63	2.26	
20	4.8	2.8	3.6	2.11	3.7	1.72	2.16	
21	5.0	2.6	3.8	1.96	5.4	1.72	2.05	
22	5.2	2.45	3.8	1.96	7.6	1.67	1.9	
23	5.4	2.7	3.5	1.86	9.0	1.87	1.9	
24	5.1	2.8	2.9	1.86	8.7	1.67	1.8	
25	4.1	3.5	2.50	1.71	7.7	1.62	1.8	
26	3.6	4.6	2.13	1.41	6.7	1.57	1.8	
27	2.95	5.3	1.83	1.21	6.0	1.52	1.8	
28	2.55	5.7	1.63	1.21	5.3	1.52	1.8	
29	2.2	5.2	1.48	1.41	4.8	1.52	1.8	
30	2.0	4.6		1.56	4.1	1.42	1.8	
31		4.2		1.56	3.6		1.8	

Daily discharge, in second-feet, of Beaver Creek near Saco, Mont., for 1912.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1		19	89	1.0	8.8	72	3.4	13
2		17	79	3.6	8.8	55	3.4	13
3		21	72	7.6	8.8	41	3.4	13
4		29	57	32	10	45	3.4	10
5		30	47	74	12	55	3.4	10
6		40	45	170	12	79	5.2	9.7
7	342	100	43	460	12	89	5.2	9.7
8	202	650	31	470	8.5	84	5.2	9.7
9	152	700	27	510	6.0	65	5.2	9.7
10	89	700	19	610	6.0	49	7.3	9.4
11	67	600	15	530	8.5	24	7.3	9.2
12	57	230	11	404	8.5	16	7.3	9.0
13	47	294	9.7	286	8.5	9.4	7.3	8.8
14	53	195	8.2	202	8.5	5.6	7.3	
15	45	158	6.8	134	8.5	5.6	10	
16	65	124	6.8	104	12	5.6	10	
17	109	104	28	74	12	5.6	12	
18	164	74	61	51	17	5.6	21	
19	170	63	84	37	41	7.9	31	
20	152	53	89	25	94	11	27	
21	164	45	99	19	188	11	23	
22	176	39	99	19	359	9.1	17	
23	188	49	84	15	490	16	17	
24	170	53	57	15	460	9.1	13	
25	114	84	41	10	368	7.6	13	
26	89	140	26	3.2	286	6.4	13	
27	59	182	14	.8	230	5.4	13	
28	43	209	7.9	.8	182	5.4	13	
29	29	176	4.6	3.2	152	5.4	13	
30	21	140	2.8	6.2	114	3.4	13	
31		119		6.2	89		13	

NOTE.—Daily discharge determined from a rating curve well defined below, and poorly defined above gage height of 6 feet. Daily discharge estimated May 5-7 and 9-11. Discharge interpolated for other days when gage heights are missing.

Monthly discharge of Beaver Creek near Saco, Mont., for 1912.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accu- racy.
	Maximum.	Minimum.	Mean.		
April 7-30.....	342	21	118	5,620	B.
May.....	^a 700	17	175	10,800	C.
June.....	99	2.8	42.1	2,510	A.
July.....	610	.8	138	8,480	B.
August.....	490	6.0	104	6,400	B.
September.....	89	3.4	27	1,600	A.
October.....	31	3.4	11.2	689	A.
November 1-13.....	13	8.8	10.3	266	A.
The period.....				36,400	

^a Estimated.

BEAVER CREEK OVERFLOW NEAR BOWDOIN, MONT.

Location.—In the SW. $\frac{1}{4}$ sec. 17, T. 30 N., R. 32 E., at John Turmell's ranch, 14 miles from Malta, Mont.

Records available.—June 29, 1903, to August 30, 1906; May 2, 1908, to December 31, 1910; March 20, 1911, to November 9, 1912. The gage was washed out and bench marks destroyed in the spring of 1912. Gage heights for 1912 are referred to a new datum.

Gage.—Staff.

Channel.—Water flows in this channel only when Beaver Creek is high; during the remainder of the season the water is standing in pools, and fluctuations in water level are due wholly to local rains and to evaporation.

Discharge measurements.—At flood stages made at a bridge half a mile below the gage; low-water measurements are made by wading near the gage.

Accuracy.—Records poor.

Discharge measurements of Beaver Creek overflow near Bowdoin, Mont., in 1912.

Date.	Hydrographer.	Gage height.	Dis-charge.	Date.	Hydrographer.	Gage height.	Dis-charge.
		<i>Feet.</i>	<i>Sec.-ft.</i>			<i>Feet.</i>	<i>Sec.-ft.</i>
Apr. 27	B. E. Jones.....	3.30	36	July 27	R. R. Randell.....	^a 2.01	0
May 9do.....	8.01	1,170	Aug. 29do.....	3.45	27
June 23	R. R. Randell.....	3.81	52	Sept. 8do.....	4.30	86
June 16do.....	3.63	21				

^a Point of zero flow.

Daily gage height, in feet, of Beaver Creek overflow near Bowdoin, Mont., for 1912.

[H. Turmell, observer.]

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1.....	8.9	3.0	4.65	3.95	1.8	3.15	2.15	1.6
2.....		3.0	4.8	4.0	1.85	3.1	2.1	1.65
3.....		2.9	4.85	4.25	1.8	3.15	2.15	1.6
4.....		2.9	4.55	5.2	1.75	3.15	2.0	1.65
5.....		3.05	4.3	4.55	1.75	3.3	2.05	1.65
6.....		3.6	4.15	5.7	1.7	3.35	2.05	1.6
7.....		4.65	4.0	6.7	1.65	3.6	2.0	1.55
8.....		7.8	3.95	6.3	1.6	4.45	1.95	1.5
9.....		8.0	3.85	6.7	1.65	4.05	1.9	1.55
10.....		8.0	3.8	7.1	1.55	3.8	2.05	

Daily gage height, in feet, of Beaver Creek overflow near Bowdoin, Mont., for 1912—Con.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
11.		7.9	3.75	6.3	1.5	3.65	2.05	-----
12.		7.3	3.6	5.0	1.55	3.4	1.9	-----
13.		5.9	3.55	4.25	1.5	3.35	1.95	-----
14.		4.95	3.95	3.5	1.55	3.25	1.9	-----
15.		4.75	3.8	3.25	1.55	3.1	1.95	-----
16.		4.3	3.65	2.95	1.5	3.05	1.95	-----
17.	4.75	4.15	3.7	2.5	1.55	2.9	1.8	-----
18.	5.0	4.00	3.05	2.45	1.6	2.85	1.85	-----
19.	4.75	3.83	3.35	2.3	3.95	2.75	1.8	-----
20.	4.5	3.85	3.2	2.35	4.0	2.6	1.85	-----
21.	5.3	3.8	5.15	2.25	5.2	2.55	1.85	-----
22.	5.4	4.05	5.0	2.1	7.1	2.5	1.8	-----
23.	5.1	3.8	4.55	2.05	7.4	2.55	1.75	-----
24.	4.7	4.0	4.35	2.0	6.7	2.45	1.7	-----
25.	4.1	5.15	4.1	2.05	6.0	2.4	1.75	-----
26.	3.7	5.3	4.05	2.05	5.6	2.45	1.75	-----
27.	3.4	4.95	3.8	1.9	5.1	2.3	1.7	-----
28.	3.3	5.2	3.65	1.95	4.45	2.35	1.75	-----
29.	3.2	5.05	3.5	1.9	3.75	2.2	1.7	-----
30.	3.1	4.75	3.45	1.95	3.35	2.25	1.75	-----
31.		4.7	-----	1.95	3.1	-----	1.65	-----

NOTE.—Gage height relation to discharge Apr. 1 probably distorted by ice.

Daily discharge, in second-feet, of Beaver Creek overflow near Bowdoin, Mont., for 1912.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1.		22	115	36	0.0	16	0.8	-----
2.		22	130	39	.0	15	.5	-----
3.		19	138	56	.0	16	.8	-----
4.		19	98	170	.0	16	.0	-----
5.		24	75	86	.0	21	.2	-----
6.		53	62	270	.0	23	.2	-----
7.		168	46	660	.0	34	.0	-----
8.		1,080	43	520	.0	108	.0	-----
9.		1,160	37	660	.0	67	.0	-----
10.		1,160	34	800	.0	46	.2	-----
11.		1,120	32	520	.0	37	.2	-----
12.		880	23	186	.0	25	-----	-----
13.		400	21	87	.0	23	-----	-----
14.		177	40	29	.0	20	-----	-----
15.		145	34	20	.0	15	-----	-----
16.		92	22	10	.0	14	-----	-----
17.	184	77	24	3.0	.0	9.0	-----	-----
18.	230	62	147	2.5	.0	8.0	-----	-----
19.	184	48	200	1.5	58	6.2	-----	-----
20.	144	50	170	1.8	62	4.0	-----	-----
21.	300	46	162	1.2	226	3.5	-----	-----
22.	325	67	140	.5	800	3.0	-----	-----
23.	250	46	86	.2	920	3.5	-----	-----
24.	176	57	65	.0	660	2.5	-----	-----
25.	96	207	45	.2	430	2.0	-----	-----
26.	60	235	42	.2	316	2.5	-----	-----
27.	41	169	28	.0	206	1.5	-----	-----
28.	36	208	22	.0	108	1.8	-----	-----
29.	31	175	16	.0	43	1.0	-----	-----
30.	26	130	14	.0	23	1.2	-----	-----
31.		122	-----	.0	15	-----	-----	-----

NOTE.—Daily discharge determined as follows: Apr. 17 to May 7 from a fairly well-defined rating curve; May 8-23 and July 7 to Oct. 11 from a fairly well-defined rating curve; June 16 to July 6 from a poorly-defined rating curve and May 24 to June 15 by indirect method for shifting channels. Stream practically dry Oct. 12 to Nov. 9.

Monthly discharge of Beaver Creek overflow near Bowdoin, Mont., for 1912.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accu- racy.
	Maximum.	Minimum.	Mean.		
April 17-30.....	325	26	149	4,140	B.
May.....	1,160	19	266	16,400	B.
June.....	200	14	70.4	4,190	C.
July.....	800	.0	134	8,240	B.
August.....	920	.0	125	7,690	B.
September.....	108	1.0	18.2	1,080	B.
October.....	.8	.0	.09	5.5	B.
November 1-9.....	.0	.0	.00	.0	B.
The period.....				41,700	

ROCK CREEK NEAR HINSDALE, MONT.

Location.—In sec. 10, T. 31 N., R. 36 E., at Ottenstror's ranch, about 2 miles below the head gates of Rock Creek canal and 6 miles northeast of Hinsdale.

Records available.—April 19, 1912, to December 31, 1912. From July 5, 1905, to December 31, 1907, data were obtained at a station 2 miles upstream, just below the diversion dam of the Rock Creek canal. The flow at these two points is practically the same.

Drainage area.—Not measured.

Gage.—Overhanging chain gage on the left bank.

Channel.—Shifts slightly at high water.

Discharge measurements.—Made by wading one-fourth mile below the gage at low and medium stages and from a bridge 2 miles below at high stages.

Winter flow.—Affected by ice.

Diversions.—There is no storage, but the normal summer flow is appropriated and used during the irrigation season.

Accuracy.—Conditions for obtaining accurate discharge data are good.

Discharge measurements of Rock Creek near Hinsdale, Mont., in 1912.

Date.	Hydrographer.	Gage height.	Dis-charge.	Date.	Hydrographer.	Gage height.	Dis-charge.
		<i>Feet.</i>	<i>Sec.-ft.</i>			<i>Feet.</i>	<i>Sec.-ft.</i>
Apr. 19	B. E. Jones.....	8.90	727	June 18	R. R. Randell.....	6.64	117
26	do.....	6.80	158	July 29	do.....	5.80	12.6
May 4	do.....	6.45	87	Aug. 31	do.....	5.89	21
25	R. R. Randell.....	6.21	59	Nov. 14	do.....	5.74	11.7

^a Ice at the gage but not at the control.

Daily gage height, in feet, of Rock Creek near Hinsdale, Mont., for 1912.

[Mrs. John Ottenstrohr, observer.]

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1.....		6.5		6.15	5.7	5.9	5.7	5.75
2.....		6.45		6.25	5.7	5.9	5.75	5.75
3.....		6.45		6.15	5.7	5.85	5.8	5.75
4.....		6.45		6.35	5.7	5.8	5.75	5.75
5.....		6.55		7.05	5.7	6.2	5.75	5.75
6.....		10.2		6.85	5.7	7.1	5.75	5.7
7.....		11.2		6.85	5.7	6.05	5.75	5.75
8.....		9.3		6.20	5.7	5.9	5.8	5.75
9.....		7.8		6.18	5.7	5.9	5.75	5.75
10.....		7.9		7.70	5.7	5.95	5.75

Daily gage height, in feet, of Rock Creek near Hinsdale, Mont., for 1912—Continued.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
11.		7.15		6.7	5.65	5.95	5.75	
12.		7.0		6.4	5.7	5.9	5.75	
13.		6.85		6.2	5.7	5.9	5.8	
14.		6.65		6.1	5.3	5.9	5.75	
15.		6.55		6.08	5.4	5.8	5.75	
16.		6.4		5.90	5.35	5.75	5.75	
17.		6.35		5.95	5.4	5.8	5.80	
18.		6.2		5.85	5.8	5.75	5.78	
19.	8.9	6.2	6.6	5.8	8.3	5.75	5.78	
20.	8.3	6.15	6.45	5.85	12.4	5.8	5.75	
21.	7.8	6.1	6.3	5.9	7.85	5.75	5.75	
22.	7.5	6.1	6.3	5.75	6.8	5.8	5.75	
23.	7.2	6.45	6.2	5.8	6.7	5.8	5.75	
24.	7.0	6.3	6.1	5.82	6.3	5.7	5.75	
25.	6.9	6.2	6.1	5.9	6.2	5.7	5.75	
26.	6.8	6.1	6.05	5.85	6.05	5.65	5.75	
27.	6.75	6.7	6.08	5.88	6.0	5.7	5.75	
28.	6.7		6.0	5.75	5.9	5.65	5.75	
29.	6.7		6.0	5.7	5.9	5.65	5.75	
30.	6.6		6.05	5.7	5.85	5.7	5.75	
31.				5.7	5.85		5.75	

NOTE.—The gage was washed out May 28 and replaced June 19.

Daily discharge, in second-feet, of Rock Creek near Hinsdale, Mont., for 1912.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1.		96		46	10	20	10	12
2.		88		59	10	20	12	12
3.		88		46	10	17	14	12
4.		88		73	10	14	12	12
5.		105		205	10	52	12	12
6.		1,270		162	10	216	12	12
7.		1,750		162	10	35	12	12
8.		895		52	10	20	14	10
9.		392		50	10	20	12	12
10.		420		364	10	25	12	12
11.		228		132	8	25	12	12
12.		194		80	10	20	12	12
13.		162		52	10	20	14	12
14.		123		40	1	20	12	12
15.		105		38	2	14	12	12
16.		80		20	2	12	12	
17.		73		25	2	14	14	
18.		52		17	14	12	13	
19.	740	52	114	14	540	12	13	
20.	540	46	88	17	2,400	14	12	
21.	392	40	66	20	406	12	12	
22.	312	40	66	12	152	14	12	
23.	240	88	52	14	132	14	12	
24.	194	66	40	15	66	10	12	
25.	172	52	40	20	52	10	12	
26.	152	40	35	17	35	8	12	
27.	142	132	38	19	30	10	12	
28.	132		30	12	20	8	12	
29.	132		30	10	20	8	12	
30.	114		35	10	17	10	12	
31.				10	17		12	

NOTE.—Daily discharge determined from a well-defined rating curve. Discharge Nov. 10-15 estimated from gage height Nov. 9 and a current-meter measurement Nov. 14.

Monthly discharge of Rock Creek near Hinsdale, Mont., for 1912.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accu- racy.
	Maximum.	Minimum.	Mean.		
April 19-30.....	^a 740	114	272	6,470	A.
May 1-27.....	1,750	40	251	13,400	A.
June 19-30.....	114	30	52.8	1,260	A.
July.....	364	10	58.5	3,600	A.
August.....	2,400	1	130	7,990	A.
September.....	216	8	23.5	1,400	A.
October.....	14	10	12.3	1,756	A.
November 1-15.....	12	10	11.9	354	A.
The period.....				35,200	

^a The maximum discharge during the flood of Apr. 1 to 10 was estimated from a cross section and slope of the stream at the highway bridge below the station, using Kutter's formula with "n" equal to ".030" for the main stream and ".040" for the overflow. This estimate was checked by applying the high-water mark at the station to the station-rating curve. Although no high-water measurements have been made, the general direction of the curve should give fair results. The discharge obtained was 10,000 second-feet. The old observer, Mr. Hulbert, estimated the flood of 1906 to have been 1 foot higher at the old station on Rock Creek than that of 1912.

PORCUPINE CREEK AT NASHUA, MONT.

Location.—In the center of the NW. $\frac{1}{4}$ sec. 25, T. 28 N., R. 40 E., at Nashua, Mont.

Records available.—July 11, 1908, to December 31, 1912.

Drainage area.—Not measured.

Gage.—Staff, nailed to tree on left bank.

Channel.—Dry in late summer and in winter.

Discharge measurements.—Made by wading near gage or from a bridge about one-fourth mile below.

Diversions and storage.—The water of this stream is neither diverted nor stored.

Discharge measurements of Porcupine Creek at Nashua, Mont., in 1912.

Date.	Hydrographer.	Gage height.	Dis-charge.	Date.	Hydrographer.	Gage height.	Dis-charge.
		<i>Feet.</i>	<i>Sec.-ft.</i>			<i>Feet.</i>	<i>Sec.-ft.</i>
Apr. 17	B. E. Jones.....	8.44	250	June 21	R. R. Randell.....	3.71	12.9
May 30	R. R. Randell.....	11.70	^a 379	July 10do.....	3.42	3.7
June 20do.....	3.74	14.6	Sept. 5do.....	4.02	23

^a Surface velocities reduced by a coefficient of 0.90 were used.

Daily gage height, in feet, of Porcupine Creek at Nashua, Mont., for 1912.

[Mrs. B. H. Burger, observer.]

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1.....	6.6	4.5	7.0	3.2	3.3	4.3	3.5	3.7
2.....	7.6	4.4	6.6	3.5	3.2	4.1	3.5	3.7
3.....	11.8	4.3	6.0	3.3	3.2	4.1	3.5	3.8
4.....	16.0	4.3	5.9	3.6	3.3	4.2	3.6	3.7
5.....	16.5	4.7	5.8	3.8	3.2	4.3	3.5	3.7
6.....	15.9	11.3	5.1	3.9	3.2	4.7	3.6	3.8
7.....	16.1	9.0	4.9	3.7	3.2	4.8	3.7	3.7
8.....	16.3	7.5	4.8	3.7	3.1	4.7	3.6	3.7
9.....	16.7	8.0	4.5	3.5	3.1	4.7	3.6	3.8
10.....	16.3	6.2	4.3	3.5	3.1	4.6	3.9	3.7
11.....	16.5	5.4	4.1	3.4	3.2	4.5	3.8	3.7
12.....	16.4	5.0	4.0	3.5	3.1	4.1	3.8
13.....	16.0	4.8	3.9	3.4	3.1	3.0	3.6
14.....	12.0	4.6	3.7	3.4	3.2	3.1	3.7
15.....	9.4	4.4	3.8	3.5	3.1	3.0	3.5

Daily gage height, in feet, of Porcupine Creek at Nashua, Mont., for 1912—Continued.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
16.....	9.2	4.3	4.7	3.4	3.2	3.8	3.5
17.....	8.4	4.2	4.5	3.3	3.3	3.8	3.6
18.....	7.4	4.1	4.4	3.4	3.2	3.5	3.5
19.....	7.2	4.0	3.7	3.4	15.0	3.3	3.5
20.....	7.0	4.0	3.5	3.4	17.2	3.4	3.6
21.....	6.5	3.9	3.3	3.3	15.2	3.7	3.5
22.....	6.1	3.4	3.4	3.4	12.3	3.7	3.5
23.....	5.8	8.1	3.8	3.3	9.2	3.5	3.5
24.....	5.5	6.7	3.7	3.3	6.7	3.6	3.6
25.....	5.2	5.8	3.7	3.3	5.8	3.5	3.5
26.....	5.0	5.0	3.4	3.2	4.7	3.5	3.5
27.....	4.9	4.8	3.3	3.2	4.7	3.6	3.7
28.....	4.9	16.5	3.3	3.3	4.8	3.5	3.7
29.....	4.7	16.4	3.1	3.2	5.4	3.5	3.7
30.....	4.6	15.9	3.1	3.2	4.7	3.6	3.8
31.....	12.5	3.2	4.6	3.7

NOTE.—Stream over the gage Apr. 3 and over the banks Apr. 4 to 14. The gage heights from Apr. 3 to 14, inclusive, were estimated from flood marks and notes furnished by the observer.

Daily discharge, in second-feet, of Porcupine Creek at Nashua, Mont., for 1912.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1.....	125	40	145	1.7	2.7	32	6.0	12
2.....	175	36	125	6.0	1.7	24	6.0	12
3.....	413	32	100	2.7	1.7	24	6.0	15
4.....	665	32	96	9.0	2.7	28	9.0	12
5.....	700	48	92	15	1.7	32	6.0	12
6.....	659	383	64	18	1.7	48	9.0	15
7.....	672	245	56	12	1.7	52	12	12
8.....	686	170	52	12	1.0	48	9.0	12
9.....	714	195	40	6.0	1.0	48	9.0	15
10.....	686	108	32	6.0	1.0	44	18	12
11.....	700	76	24	4.0	1.7	40	15	12
12.....	693	60	21	6.0	1.0	24	15
13.....	665	52	18	4.0	1.0	.3	9.0
14.....	425	44	12	4.0	1.7	1.0	12
15.....	269	36	15	6.0	1.0	.3	6.0
16.....	257	32	48	4.0	1.7	15	6.0
17.....	215	28	40	2.7	2.7	15	9.0
18.....	165	24	36	4.0	1.7	6.0	6.0
19.....	155	21	12	4.0	605	2.7	6.0
20.....	145	21	6	4.0	749	4.0	9.0
21.....	120	18	2.7	2.7	617	12	6.0
22.....	104	4.0	4.0	4.0	443	12	6.0
23.....	92	200	15	2.7	257	6.0	6.0
24.....	80	130	12	2.7	130	9.0	9.0
25.....	68	92	12	2.7	92	6.0	6.0
26.....	60	60	4.0	1.7	48	6.0	6.0
27.....	56	52	2.7	1.7	48	9.0	12
28.....	56	700	2.7	2.7	52	6.0	12
29.....	48	693	1.0	1.7	76	6.0	12
30.....	44	659	1.0	1.7	48	9.0	15
31.....	455	1.7	44	12

NOTE.—Daily discharge determined from a fairly well-defined rating curve.

Monthly discharge of Porcupine Creek at Nashua, Mont., for 1912.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accu- racy.
	Maximum.	Minimum.	Mean.		
April.....	714	44	330	19,600	C.
May.....	700	4.0	153	9,410	B.
June.....	145	1.0	36.4	2,170	B.
July.....	18	1.7	5.07	312	B.
August.....	749	1.0	104	6,400	B.
September.....	52	.3	19.0	1,130	B.
October.....	18	6.0	9.19	565	B.
November 1-11.....	15	12	12.8	279	B.
The period.....				39,900	

FLOODS IN MILK RIVER BASIN, APRIL, 1912.

CAUSES.

During the first 20 days of April, 1912, the streams in the Milk River basin were at an exceptionally high stage, which from Malta to the mouth of the river amounted to flood. Unlike previous floods of which there is record, this flood was caused wholly by the rapid melting of snow during a period of warm weather that came so early that the winter snows still lay on ground saturated by the excessive rainfall in the autumn of 1911 and probably frozen to a considerable depth; so that the whole run-off had to be carried by the surface channels. The precipitation during the winter was not heavy, the total for December, 1911, and January, February, and March, 1912, amounting to 1.71 inches at Havre, 1.19 inches at Malta, and for January, February, and March, 1912, to 1.13 inches at Glasgow; but 1.23 inches of rain fell at Havre on April 11, 12, and 13, 1.25 inches fell at Malta from April 11 to 14, and 0.90 inch at Glasgow on April 13. The rise in the streams caused by this rainfall was not, however, proportional to its amount. Above Havre the run-off was not excessive, partly because of lack of large tributaries and partly because there was less snow or the snow was less evenly distributed. From Havre to Malta the water was very high but did little damage, the river in most places remaining within its banks. Below Malta the river overflowed its banks most of the way to its mouth, causing considerable damage and flooding several towns, notably Glasgow. Saco was flooded by the waters of Beaver Creek. From Hinsdale down the river rose about as high as during the flood of June, 1906, but sustained the stage much longer, the mean for April, 1912, at Malta being 5,540 second-feet, as compared with 4,150 second-feet for June, 1906.

The streams of the flooded area are fairly well covered by the regular stations of the Geological Survey, and several miscellaneous

measurements were made of creeks on which stations are not maintained. The following table shows the daily discharge at the regular stations of the Geological Survey for April, 1912.

Daily discharge, in second-feet, at gaging stations in Milk River valley flood of April, 1912.

Day.	Milk River at Havre.	Milk River at Malta.	Milk River at Hinsdale.	Area tributary to Milk River between Havre and Malta.	Area tributary to Milk River between Malta and Hinsdale.	North fork of Milk River near Chinook.	Beaver Creek near Saco.	Rock Creek near Hinsdale.	Porcupine Creek near Nashua.	Beaver Creek overflow near Bowdoin.
1.....	3,960	5,500	6,000	1,540	500	120	125	1,000
2.....	4,170	5,830	7,000	1,660	1,170	300	475	175
3.....	4,280	6,000	8,000	1,720	2,000	716	413
4.....	3,540	7,020	9,000	3,480	1,980	2,600	665
5.....	2,830	8,930	16,000	6,100	7,070	3,710	700
6.....	2,100	9,120	24,200	7,020	15,080	3,180	659
7.....	2,020	9,120	23,900	7,100	14,780	3,510	342	672
8.....	1,690	9,120	23,600	7,430	14,480	4,000	262	686
9.....	1,310	9,060	22,300	7,750	13,240	3,590	152	714
10.....	980	9,060	21,000	8,080	11,940	3,180	89	686
11.....	1,170	9,120	20,900	7,950	11,780	2,650	67	700
12.....	1,170	9,120	20,600	7,950	11,480	1,980	57	693
13.....	1,310	9,260	20,300	7,950	11,040	1,620	47	665
14.....	1,240	9,320	20,000	8,080	10,680	1,500	53	425
15.....	1,100	7,890	19,700	6,790	11,810	1,700	45	269
16.....	1,040	6,180	19,400	5,140	13,220	1,110	65	257
17.....	860	5,700	19,100	4,840	13,400	757	109	215	184
18.....	860	5,160	18,800	4,300	13,640	560	164	1,060	165	230
19.....	690	4,820	14,600	4,130	9,780	471	170	740	155	184
20.....	690	3,680	10,400	2,990	6,720	385	152	540	145	144
21.....	745	2,860	9,000	2,115	6,140	357	164	392	120	300
22.....	745	2,180	7,480	1,435	5,300	310	176	312	104	325
23.....	590	1,900	5,470	1,310	3,570	260	188	240	92	250
24.....	640	1,760	4,480	1,120	2,720	260	170	194	80	176
25.....	590	1,540	3,780	950	2,240	250	114	172	68	96
26.....	640	1,410	2,930	770	1,520	235	89	152	60	60
27.....	545	1,410	2,440	865	1,030	210	59	142	56	41
28.....	545	1,340	2,440	795	1,100	200	43	132	56	36
29.....	545	1,410	2,370	865	960	200	29	132	48	31
30.....	500	1,280	2,230	780	950	190	21	114	44	26
Mean.....	1,440	5,540	12,900	4,100	7,380	1,340	330
Max.....	4,280	9,320	24,200	8,080	15,080	4,000	714

The estimated maximum discharge for June, 1906, and April, 1912, of streams in the Milk River Valley, with the drainage area of some of them, is shown by the following table. The estimates for the flood of June, 1906, as published in Water-Supply Paper 208, are given for comparison.

An attempt has been made to give an accurate rating to the estimates for 1912. A similar rating could not well be made for those estimates of 1906, but it should be borne in mind that the latter were made largely by applying Kutter's formula to flood cross sections and surface slopes, and such estimates are liable to large errors due to variation in the value assumed for "n."

Maximum discharge, in second-feet, of streams in Milk River valley below Havre flood of June, 1906, and April, 1912.

Station.	Locality.	Area of drainage basin.	Flood of June, 1906.	Flood of April, 1912.
		<i>Sq. miles.</i>	<i>Sec.-ft.</i>	<i>Sec.-ft.</i>
Milk River.....	Havre.....	5,050	4,000	<i>a b</i> 4,860
Do.....	Malta.....	10,700	11,250	<i>b</i> 9,320
Do.....	Hinsdale.....	17,300	<i>c</i> 24,200
Area tributary to Milk River between Havre and Malta.....	5,650	8,920	<i>b</i> 8,080
Area tributary to Milk River between Malta and Hinsdale.....	6,600	<i>b</i> 15,080
North fork of Milk River.....	Chinook.....	1,432	<i>d</i> 7,700	<i>b</i> 4,000
Frenchman Creek.....	Saco.....	1,700	6,500	<i>b</i> 3,860
Beaver Creek.....	do.....	6,650	<i>c</i> 1,810
Beaver Creek below mouth of Larb Creek.....	Hinsdale.....	<i>c</i> 4,630
Beaver Creek overflow.....	Bowdoin.....	<i>c</i> 3,040
Rock Creek.....	Hinsdale.....	976	18,000	<i>e</i> 10,000
Peoples Creek.....	Dodson.....	<i>f</i> 4,500	<i>g</i> 1,700
Alkali Creek.....	Malta.....	5,300	<i>g</i> 2,300
Whitewater Creek.....	Saco.....	3,500
Antelope Creek.....	Tampico.....	2,300	<i>g</i> 1,410
Brazil Creek.....	Glasgow.....	2,900	<i>g</i> 2,160
Cherry Creek.....	do.....	1,240	<i>g</i> 1,460

a Mean for day, 4,280 second-feet.

b Estimate probably good.

c Estimate probably fair and within 15 per cent.

d Discharge at this rate lasted only a short time; mean for day, 4,600 second-feet.

e Computed from the high-water marks at the bridge 3 miles above mouth and at the station 5 miles above mouth. If the high water on Rock Creek and Milk River occurred simultaneously both places were affected by backwater and the result should be somewhat smaller. Discharge probably did not exceed amount given.

f Includes overflow.

g Estimate based on flood section and surface slope, using Kutter's formula; accuracy doubtful; results should be used only in connection with other data.

NOTE.—The estimates of maximum discharge for the flood of June, 1906, outside of the stations on Milk River at Havre and Malta, are based largely on flood cross sections and surface slope and should not be used except in connection with other data.

These tables indicate fairly well the source of the flood, its cause, and, in connection with the flood of June, 1906, give a very good basis for estimating future floods of the same character.

DETAILS BY BASINS.

The flood can best be studied by dividing the basin into four parts, (1) above Havre, (2) from Havre to Malta, (3) from Malta to Hinsdale, and (4) below Hinsdale.

Above Havre the flood was small and its duration was short. The maximum discharge came on April 3, which is earlier than at any other point of which record is available, except possibly Beaver Creek. Probably most of the water at Havre came from Sage Creek, a large tributary that enters just above Havre.

If the area above the Canadian line is deducted from the drainage area at Havre only 1,250 square miles remains as the area actually affected by the flood, or nearly the same as the area drained by North Fork of Milk River. The mean flow of the North Fork of Milk River is 1,340 second-feet, to be compared with 1,440 second-feet of the Milk at Havre.

Between Havre and Malta several large creeks enter Milk River, the total tributary area between the two stations being 5,650 square

miles. The maximum discharge at Malta came on April 14, but the stage was practically constant from April 5 to April 14. That it did not go higher is probably due partly to storage and partly to the fact that the creeks coming from the south, such as Peoples Creek, Snake Creek, and Clear Creek, reached their maximum flow about April 2 or 3, as did also Beaver Creek, whereas West Fork, like North Fork, was probably highest about April 8. Considerable water was also stored between Havre and Malta, as is shown by the flow at Malta during the latter part of the flood.

If the flow of West Fork of Milk River is assumed equal to that of North Fork in the period from April 12 to 20, inclusive, the drainage area being nearly the same, the run-off from about half of area between Havre and Malta is accounted for. The other half of the drainage lies south of the river and probably contributed very little to the run-off after April 12. The rate of run-off may therefore be estimated at one-half that of North Fork and West Fork. This assumption gives a discharge at Malta for nine days of about 1,300 second-feet due to storage. The fact that practically all of this amount was stored previous to April 5, the day on which the river reached flood stage, probably accounts for the small discharge from the area between Havre and Malta for the first four days of April.

The drainage area between Malta and Hinsdale is not much larger than that between Havre and Malta, but both the maximum and mean discharge for the flood are nearly twice as great, probably because of the larger quantity of snow on the area. In this stretch three large tributaries—Beaver, Rock, and Frenchman creeks—enter within a short distance, giving opportunity for regulating flow by natural storage in the river channel. Beaver Creek, which comes from the south, reached its maximum stage at Hinsdale about April 6, and on April 7 had receded only 0.6 foot. The maximum discharge was estimated very roughly at 4,630 second-feet from a measurement of the main channel on April 7 and a cross-section of the overflow. After April 7 Beaver Creek fell rapidly. In considering the records of the station near Saco it should be remembered that the discharge at the mouth of the creek includes also the water carried by Beaver Creek overflow and Larb Creek.

Rock Creek, like Beaver Creek, probably reached its maximum flow about April 6, and remained high for some time.

Frenchman Creek reached its maximum stage about April 18, but must have had a large discharge on April 6. No information is available concerning the other creeks that enter between Malta and Hinsdale, but they were probably at maximum stage about April 6. A fairly good check on the estimates is obtained by adding the total flow of these creeks to that of Milk River at Malta for April 5, and comparing the sum with the flow at Hinsdale. If the maximum

flow of Rock Creek is assumed as 10,000 second-feet, Beaver Creek at Hinsdale at 4,600 second-feet, Frenchman Creek and Whitewater Creek at 3,000 second-feet each, the total is 20,600 second-feet. For Cottonwood Creek and Little Cottonwood Creek no data are available except the estimates for June, 1906, which appear high. The drainage area for these two creeks is small, so that if the discharge was very high it could not have lasted long, as the mean discharge of 5,000 second-feet may be assumed for these two creeks on April 6. Adding the flow at Malta on April 5 gives a total of 34,500 second-feet to be accounted for at Hinsdale. The discharge at Hinsdale was 24,200 second-feet, leaving 10,000 second-feet to be accounted for by storage or deducted from the estimates. Milk River at Hinsdale rose from 9,000 second-feet on April 4 to 24,200 second-feet on April 6, so that a large part of the total storage was consumed in two days. The amount of this storage can be estimated from the flow during the period of falling stage—from April 14 to 21, inclusive. Assuming Rock Creek to have been discharging 4,000, 3,000, 2,000, and 1,500 second-feet on April 14 to 17, estimating Frenchman Creek at 3,000 second-feet per day, taking Beaver Creek overflow at twice the flow of Beaver Creek for the three days for which gage heights are missing, and estimating the combined flow of the remaining tributaries, including Cottonwood, Whitewater, and Larb creeks at 2,000 second-feet per day, which is probably high, there still remains a total of 30,000 second-feet at Hinsdale coming from storage. As the upper end of the river, at Malta, was already at flood stage on April 5, it is probable that only about two-thirds of this storage was available. The loss of 10,000 second-feet on April 5 and 6 is thus accounted for and makes a fairly good check on the estimates for the tributary creeks.

Data on which to base estimates of flow below Hinsdale are meager and are practically all presented in the table of maximum discharges. The tributary creeks are shorter than those in the sections above, and the river is wide and winding, affording a large amount of storage.

FUTURE FLOODS.

The records of the flood of 1912, combined with those of the flood of June, 1906, afford a good basis for prediction of the effects of future floods. During April, 1912, the creeks to the south reached a flood stage a few days earlier than those from the north, and it appears reasonable to assume that this condition is normal to floods caused by melting snows. It also appears reasonable to assume that, although heavier rains than those of June, 1906, may occur, they will be sufficiently greater to cause a much larger flood. Floods due to rains usually find the river at a low stage and are regulated

by storage in the river channel, but excessive rains similar to those of June, 1906, might occur with the river still at maximum stage, as from April 6 to 20, causing a second flood on top of the first. Even in this event a rise of a few feet would result only in additional storage through the long, winding course of the river, so that the maximum height would be only a few feet greater and the maximum discharge in proportion, and the river could probably carry the excess without very great damage. At Hinsdale, however, where three large tributaries enter within a distance so short that room for storage is lacking, the menace of damage from floods is more serious. Floods due to rainfall over the areas drained by these three tributaries, coming just after a flood similar to that of April, 1912, when the river was still near a maximum stage, would pile up the water in the neighborhood of Hinsdale, possibly doubling the discharge recorded at that point in April, 1912, but this excessive high water would not reach very far downstream before the increased storage would take the peak of the flood, and at Glasgow and below the rise would probably not greatly exceed that of the floods of 1906 and 1912, the high water simply lasting over a longer period. Such an excessive flood, however, though possible, is very unlikely, and probably would not occur more than once in a hundred years.

The following table shows the elevation of various highwater marks on Milk River and its tributaries made during the flood of April, 1912:

Maximum heights of water in Milk River basin, April, 1912.

Stream.	Location.	Elevation of high-water marks above sea level.	Remarks.
Milk River.....	Hinsdale bridge, 1 mile east of Hinsdale...	<i>Feet.</i> 2,134.1	
Do.....	1 mile southeast of Hinsdale, opposite station 54, traverse No. 1, Vandaliareervoir survey.		Water surface Apr. 6, 2,133.5.
Do.....	Vandalia diversion site.....	2,124.8	Water surface Apr. 8, 2,124.0.
Do.....	Station 150, Vandalia south canal, 1 mile west of Vandalia.	2,119.1	Water surface Apr. 8, 2,118.5.
Do.....	Vandalia bridge.....	2,117.9	Water surface Apr. 10, 2,116.9.
Milk River back water.	Hay and Buffalo coulees near Vandalia....	2,113.6	Water surface Apr. 8, 2,113.0.
Do.....	Antelope creek near Tampico.....	2,097.7	
Rock Creek.....	Bridge, 3 miles above the mouth, near Hinsdale.	2,139.4	
Antelope Creek.....	Vandalia south canal crossing, Station 840, near Tampico.	2,108.9	
Brazil Creek.....	Vandalia south canal crossing, Station 1140, near Glasgow.	2,095.1	
Last branch Brazil Creek.	Vandalia south canal crossing, Station 1174, near Glasgow.	2,094.7	
Willow Creek.....	Near highway bridge east of Glasgow. Vandalia south canal crossing, Station 1460.	2,082.3	

PRIVATE CANALS IN MILK RIVER VALLEY.

GENERAL FEATURES.

Since 1905 a number of stations have been maintained on private canals in Milk River valley for the purpose of ascertaining the extent of private water rights. With the exception of Rock Creek canal, which is near Hinsdale, in Valley County, these canals are located in Hill and Blaine counties and are used to irrigate lands in the vicinity of Harlem and Chinook.

The canals are all built on small grades and in soil which is easily eroded. In many of them silt has been deposited, and nearly all of them contain a growth of weeds and moss. At low stages the water is uniformly sluggish. In order to divert water into the laterals checks are erected in the main canals, and these checks often produce back-water effects for long distances above. They were put up under a great variety of conditions, and as a result velocities are found to differ widely at the same gage height during the season. In order to establish the correct relation between gage height and discharge it is necessary to make several rating curves for the same canal station. Frequent discharge measurements are necessary to obtain reliable results. Staff gages are located on all canals and most measurements are made by wading.

PARADISE CANAL NEAR CHINOOK, MONT.

Location.—Near the headgate at Rudolph Friede's ranch; reached by driving along the south river road from Chinook.

Records available.—June, 1903, to December 31, 1912.

Discharge measurements.—Made by wading.

The following discharge measurement was made by R. R. Randell:

July 25, 1912: Gage height, 1.85 feet; discharge, 3.8 second-feet.

Daily gage height, in feet, and discharge, in second-feet, of Paradise canal near Chinook, Mont., for 1912.

[Rudolph Friede, observer.]

Day.	July.		August.		Day.	July.		August.		Day.	July.		August.	
	Gage height.	D i s - charge.	Gage height.	D i s - charge.		Gage height.	D i s - charge.	Gage height.	D i s - charge.		Gage height.	D i s - charge.	Gage height.	D i s - charge.
1.....	0.91	0.0	1.72	2.8	11.....	1.71	2.7	1.54	1.8	21.....	1.58	1.9	1.89	4.1
2.....	1.14	.6	1.90	4.2	12.....	1.66	2.4	1.41	1.3	22.....	1.70	2.6	.80	.0
3.....	1.36	1.2	1.84	3.7	13.....	1.61	2.1	1.45	1.4	23.....	1.68	2.5	.75	.0
4.....	1.10	.5	1.81	3.5	14.....	1.81	3.5	1.61	2.1	24.....	1.73	2.8	.70	.0
5.....	.88	.0	1.80	3.4	15.....	1.74	2.9	1.68	2.5	25.....	1.85	3.8	.61	.0
6.....	.12	.0	1.77	3.2	16.....	1.73	2.8	1.79	3.3	26.....	1.76	3.1	.27	.0
7.....	.32	.0	1.76	3.1	17.....	1.73	2.8	1.75	3.0	27.....	1.71	2.7	.10	.0
8.....	.90	.0	1.79	3.3	18.....	1.82	3.6	1.70	2.6	28.....	1.50	1.6	.07	.0
9.....	1.22	.8	1.74	2.9	19.....	1.70	2.6	1.86	3.9	29.....	1.46	1.5	.04	.0
10.....	1.64	2.2	1.75	3.0	20.....	1.70	2.6	1.89	4.1	30.....	1.86	3.9	.02	.0
										31.....	1.80	3.4	.01	.0

NOTE.—The gage was read Apr. 1 to Sept. 1, but the canal was either dry or water standing in pools, and the gates were not opened until July 2 and were closed Aug. 22. No flow July 5-8 on account of the crest of the diversion dam being damaged by high water. Daily discharge determined from a poorly defined rating curve.

Monthly discharge of Paradise canal near Chinook, Mont., for 1912.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accu- racy.
	Maximum.	Minimum.	Mean.		
July.....	3.9	0	2.04	125	C.
August.....	4.2	0	2.04	125	C.

COOK CANAL NEAR CHINOOK, MONT.

Location.—In N. $\frac{1}{2}$ sec. 30, T. 33 N., R. 20 E., about half a mile above a small wooden highway bridge on the road running parallel to the Great Northern Railway, about 3 miles east of Chinook.

Records available.—April 10, 1905, to December 31, 1912.

Gage.—Staff.

Discharge measurements.—Made from highway bridge.

The following discharge measurement was made by R. R. Randell:

July 25, 1912: Gage height, 1.76 feet; discharge, 1.6 second-feet.

Daily gage height, in feet, and discharge, in second-feet, of Cook canal near Chinook, Mont., for 1912.

[A. Jamison, observer.]

Day.	July.		August.		October.		Day.	July.		August.		October.	
	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.		Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
1.....			1.52	0.6			16.....	2.50	8.2				
2.....			1.55	.6			17.....	2.58	9.3				
3.....			1.55	.6			18.....	2.58	9.5				
4.....			1.5	.5			19.....	2.40	6.8				
5.....			1.45	.4			20.....	2.3	5.6				
6.....			1.1	.0	2.2	4.6	21.....	2.15	4.2				
7.....	2.3	5.6	.95	.0	2.2	4.6	22.....	2.00	3.0				
8.....	2.0	3.0	.75	.0	2.25	5.1	23.....	1.91	2.5				
9.....	2.7	11.5			2.23	4.9	24.....	1.80	1.8				
10.....	2.75	12.5			2.21	4.7	25.....	1.75	1.5				
11.....	2.75	12.5			2.15	4.2	26.....	1.7	1.2				
12.....	2.60	9.8			2.1	3.8	27.....	1.65	1.0				
13.....	2.53	8.7			2.05	3.4	28.....	1.5	.5				
14.....	2.40	6.8					29.....	1.45	.4				
15.....	2.32	5.8					30.....	1.43	.3				
							31.....	1.50	.5				

NOTE.—Daily discharge determined from a poorly-defined rating curve.

Monthly discharge of Cook canal near Chinook, Mont., for 1912.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accu- racy.
	Maximum.	Minimum.	Mean.		
July 7-31.....	12.5	0.3	5.31	263	C.
August 1-8.....	.6	.0	.34	5.4	C.
October 6-13.....	5.1	3.4	4.41	70	C.

MATHESON CANAL NEAR CHINOOK, MONT.

Location.—In NW. $\frac{1}{4}$ sec. 29, T. 33 N., R. 20 E., at a footbridge 200 feet below the headgate of the canal near the main road, $3\frac{1}{4}$ miles east of Chinook.

Records available.—April 10, 1905, to December 31, 1912.

Gage.—Staff.

Discharge measurements.—Made from footbridge or by wading.

Discharge measurements of Matheson canal near Chinook, Mont., in 1912.

Date.	Hydrographer.	Gage height.	Discharge.
		<i>Feet.</i>	<i>Sec.-ft.</i>
June 25	R. R. Randell	2.98	0.61
July 25	do.	3.20	1.38
Aug. 28	do.	3.28	1.19

Daily gage height, in feet, and discharge, in second-feet, of Matheson canal near Chinook, Mont., for 1912.

[Adam Jamison, observer.]

Day.	June.		July.		August.		September.		October.	
	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
1	3.5	3.0	3.3	1.9	3.22	1.4	3.3	0.2	3.45	0.7
2	3.5	3.0	3.3	1.9	-----	1.1	3.25	.1	3.46	.7
3	3.5	3.0	4.5	11.1	-----	.9	3.25	.1	3.43	.6
4	3.5	3.0	5.0	15.6	-----	.7	3.25	.1	3.48	.8
5	3.5	3.0	4.0	6.6	3.0	.4	3.25	.1	3.50	.9
6	5.0	.6	3.5	3.0	3.12	.8	3.3	.2	3.51	.9
7	3.0	.6	3.4	2.4	3.25	1.2	3.3	.2	3.51	.9
8	3.0	.6	3.3	1.9	3.48	2.3	3.3	.2	3.53	1.0
9	3.0	.6	3.2	1.4	3.30	1.3	3.3	.2	3.58	1.2
10	3.0	.6	3.1	1.0	3.25	1.1	3.3	.2	3.60	1.3
11	3.0	.6	3.0	.6	3.1	.5	3.30	.2	3.65	1.6
12	3.0	.6	3.0	.6	3.00	.2	3.31	.2	3.6	1.3
13	3.0	.6	3.3	1.9	2.98	.1	3.32	.3	-----	-----
14	4.3	9.3	3.3	1.9	2.90	.0	3.35	.4	-----	-----
15	5.0	15.6	3.30	1.9	2.81	.0	3.4	.5	-----	-----
16	5.0	15.6	3.31	2.0	2.70	.0	3.45	.7	-----	-----
17	5.0	15.6	3.3	1.9	2.72	.0	3.47	.8	-----	-----
18	5.0	15.6	3.3	1.9	2.75	.0	3.45	.7	-----	-----
19	4.8	13.8	3.35	2.2	3.1	.1	3.41	.5	-----	-----
20	4.8	13.8	3.38	2.3	3.90	3.3	3.40	.5	-----	-----
21	4.5	11.1	3.3	1.9	3.68	2.1	3.4	.5	-----	-----
22	4.0	6.6	3.3	1.9	3.68	1.9	3.4	.5	-----	-----
23	3.5	3.0	3.25	1.6	3.63	1.7	3.4	.5	-----	-----
24	3.0	.6	3.23	1.6	3.58	1.4	3.4	.5	-----	-----
25	2.7	.6	3.20	1.4	3.41	.6	3.40	.5	-----	-----
26	2.9	.4	3.2	1.4	3.35	.5	3.42	.6	-----	-----
27	3.3	1.9	3.2	1.4	3.32	.3	3.50	.9	-----	-----
28	3.3	1.9	3.20	1.4	3.30	.2	3.52	1.0	-----	-----
29	3.4	2.4	3.22	1.5	3.31	.2	3.49	.9	-----	-----
30	3.3	1.9	3.23	1.6	3.40	.5	3.45	.7	-----	-----
31	-----	-----	3.19	1.4	3.35	.4	-----	-----	-----	-----

NOTE.—Daily discharge determined as follows: June 1 to July 31 and Aug. 28 to Oct. 12, from two poorly defined rating curves; Aug. 1-27, by indirect method for shifting channels. Discharge interpolated for days for which gage heights are missing.

Monthly discharge of Matheson canal near Chinook, Mont., for 1912.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accu- racy.
	Maximum.	Minimum.	Mean.		
June.....	15.6	0.4	4.98	296.	C
July.....	15.6	.6	2.62	161.	C
August.....	3.3	.0	.81	49.8	C
September.....	1.0	.1	.43	25.6	C
October 1-12.....	1.6	.6	.99	23.6	C

HARLEM CANAL NEAR ZURICH, MONT.

Location.—In the SW. $\frac{1}{4}$ sec. 33, T. 33 N., about 500 feet below the head gates of the canal, $1\frac{1}{2}$ miles southeast of the Great Northern Railway section house at Zurich; reached by driving from Chinook.

Records available.—June, 1903, to December 31, 1912.

Gage.—Staff.

Discharge measurements.—Made by wading.

Discharge measurements of Harlem canal near Zurich, Mont., in 1912.

Date.	Hydrographer.	Gage height.	Dis- charge.	Date.	Hydrographer.	Gage height.	Dis- charge.
		<i>Feet.</i>	<i>Sec.-ft.</i>			<i>Feet.</i>	<i>Sec.-ft.</i>
May 17	R. R. Randell.....	1.90	14.4	June 25	R. R. Randell.....	1.70	6.8
June 3do.....	1.22	2.9	July 25do.....	3.68	18.6
14do.....	2.31	21	Aug. 28do.....	1.60	1.4

Daily gage height, in feet, of Harlem canal near Zurich, Mont., for 1912.

[Howsan Kirby, observer.]

Day.	Mar.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1			2.21	2.10	3.30	1.72	1.34	1.16
2			1.40	2.42	3.30	1.71	1.26	1.19
3			1.23	2.70	3.20	1.47	1.20	1.21
4			1.23	2.70	3.20	1.45	1.21	1.24
5			1.22	2.10	2.15	1.47	1.22	1.27
6			1.98	2.00	2.14	1.45	1.20	1.29
7			1.98	2.00	2.11	1.45	1.20	1.26
8		1.70	2.00	1.90	2.11	1.45	1.20	
9		1.75	2.40	1.90	2.10	1.45	1.20	
10		1.85	2.35	1.91	2.08	1.45	1.21	
11		1.89	2.30	2.70	2.05	1.45	1.20	
12		1.90	2.34	2.65	2.00	1.45	1.20	
13		1.89	2.31	2.35	1.90	1.45	1.20	
14		1.89	2.31	2.40		1.45	1.20	
15		1.89	2.30	2.80		1.45	1.20	
16		1.90	1.39	2.70		1.44	1.20	
17		1.90	1.40	2.70		1.44	1.20	
18		1.89	1.38	2.80		1.42	1.21	
19		1.89	1.50	2.89		1.40	1.22	
20		1.87	1.50	2.64		1.39	1.22	
21		2.40	1.50	2.65		1.37	1.20	
22		2.40	1.55	3.10		1.35	1.16	
23		2.43	1.71	3.06		1.36	1.15	
24		2.45	1.71	3.10		1.38	1.15	
25		2.50	1.71	3.10		1.40	1.15	
26	2.00	2.50	1.74	3.15		1.42	1.14	
27	2.10	2.46	1.81	3.13		1.39	1.15	
28	2.30	2.38	1.81	3.00	1.60	1.36	1.14	
29	2.70	2.30	1.98	2.40		1.36	1.14	
30	3.10	2.25	2.10	2.50		1.38	1.15	
31	3.50	2.24		3.20			1.16	

Daily discharge, in second-feet, of Harlem canal near Zurich, Mont., for 1912.

Day.	Mar.	May.	June.	July.	Aug.	Sept.	Day.	Mar.	May.	June.	July.	Aug.	Sept.
1.....			20	11	25	1.1	16.....		14	5.0	16	2.0	.7
2.....			5.5	16	25	1.0	17.....		14	5.0	16	2.0	.7
3.....			3.3	22	23	.8	18.....		14	5.0	17	2.0	.6
4.....			3.3	22	23	.8	19.....		14	5.5	19	2.0	.5
5.....			3.2	10	5.0	.8	20.....		13	5.5	14	2.0	.4
6.....			16	8.5	5.0	.8	21.....		24	5.5	14	1.5	.4
7.....			16	8.5	4.5	.8	22.....		24	5.5	22	1.5	.2
8.....		10	16	6.0	4.5	.8	23.....		25	8.0	21	1.5	.3
9.....		11	24	6.0	4.5	.8	24.....		25	7.5	21	1.5	.4
10.....		13	23	6.0	4.0	.8	25.....		26	7.0	19	1.5	.5
11.....		14	22	19	4.0	.8	26.....	16	26	6.5	21	1.5	.6
12.....		14	23	17	4.0	.8	27.....	18	25	7.5	21	1.5	.4
13.....		14	22	12	2.5	.8	28.....	22	24	7.5	18	1.5	.3
14.....		14	22	12	2.5	.8	29.....	30	22	9.5	8	1.4	.3
15.....		14	22	19	2.5	.8	30.....	39	21	11	10	1.3	.4
							31.....	49	21		23	1.2	

NOTE.—Daily discharge determined as follows: Mar. 26 to June 15, from a fairly well-defined rating curve; June 16 to Aug. 13, by indirect method for shifting channels; Aug. 28 to Sept. 30, from a poorly defined rating curve. Discharge interpolated Aug. 14-27 and 29-31. Practically no flow after Sept. 30. The flow in March is probably due to the high water in the river overflowing into the canal.

Monthly discharge of Harlem canal near Zurich, Mont., for 1912.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accu- racy.
	Maximum.	Minimum.	Mean.		
March 26-31.....	49	16	29.0	345	B.
May 8-31.....	26	10	18.2	866	B.
June.....	24	3.2	11.4	678	B.
July.....	23	6.0	15.3	941	C.
August.....	25	1.2	5.32	327	C.
September.....	1.1	.2	.64	38	C.
The period.....				3,200	

AGENCY DITCH NEAR HARLEM, MONT.

Location.—In the SW. $\frac{1}{4}$ sec. 33, T. 32 N., R. 25 E., at the highway bridge, about one-fourth mile below the headgate of the ditch, reached by driving southward from Harlem, Mont.

Records available.—July 14, 1905, to December 31, 1912.

Gage.—Staff.

Discharge measurements.—Made by wading.

Discharge measurements of Agency ditch near Harlem, Mont., in 1912.

Date.	Hydrographer.	Gage height.	Dis- charge.
June 25	R. R. Randell.....	<i>Feet.</i> 3.90	<i>Sec.-ft.</i> 33
July 25do.....	1.79	a 4.2

a Weir measurement.

Daily gage height, in feet, and discharge, in second-feet, of Agency ditch near Harlem, Mont., for 1912.

[W. B. Vestal, jr., observer.]

Day.	June.		July.		August.		Day.	June.		July.		August.	
	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.		Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
1.....			3.95	35	2.3	4	16.....			3.8	31		
2.....			3.85	32	2.3	4	17.....			3.8	31		
3.....			3.8	31	2.3	4	18.....			3.8	31		
4.....				35	2.3	4	19.....			3.8	31		
5.....			4.1	39		4	20.....			3.8	31		
6.....			4.1	39		4	21.....			3.8	31		
7.....			4.1	39		4	22.....			3.8	31		
8.....			3.9	33		4	23.....			3.8	31		
9.....			3.8	31		4	24.....			2.8	9		
10.....			3.8	31			25.....	33	2.5	4			
11.....			3.8	31			26.....	33	2.0	4			
12.....			3.8	31			27.....	33	2.0	4			
13.....			3.8	31			28.....	33	2.2	4			
14.....			3.8	31			29.....	34	2.3	4			
15.....			3.8	31			30.....	34	2.3	4			
							31.....		2.3	4			

NOTE.—Water was turned into the canal May 25 but no gage height observations were made until July 1. The mean flow from May 25 to June 24 inclusive is estimated at 40 second-feet per day.

The flashboards at the head of laterals below the gage were changed July 25. The gage height of the observer was made before this change was made, thus accounting for the difference between the observer's and hydrographer's readings.

The changes in gage height after July 25 are due to changes in the flashboards in the canal below the gage.

The canal was closed for the season on Aug. 9.

Daily discharge determined from a poorly defined rating curve.

Discharge estimated June 26 to 30 and July 26 to Aug. 9. Total for the period June 25 to Aug. 9 is 2,030 acre-feet. Accuracy about "C."

FORT BELKNAP CANAL NEAR CHINOOK, MONT.

Location.—In the SE. $\frac{1}{4}$ sec. 20, T. 33 N., R. 18 E., at the highway bridge, about 500 feet below the headgates of the canal, 8 miles west of Chinook.

Records available.—June 21, 1903, to December 31, 1912.

Gages.—The highwater of June, 1908, washed out both the bridge and the gage; a new gage was installed June 27, 1908, at a different datum within a few feet of the site of the old gage; a new bridge was built about one-fourth mile upstream from the site of the old one.

Discharge measurements.—Made by wading at a section about 300 feet below the gage.

Discharge measurements of Fort Belknap canal near Chinook, Mont., in 1912.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
May 18	R. R. Randell.....	<i>Feet.</i> 0.38	<i>Sec.-ft.</i> a 0.4	July 26	R. R. Randell.....	<i>Feet.</i> 1.50	<i>Sec.-ft.</i> 13.4
June 27do.....	1.08	11.1	Aug. 27do.....	1.75	9.6
July 8do.....	1.15	12.4				

a Estimated.

Daily gage height, in feet, and discharge, in second-feet, of Fort Belknap canal near Chinook, Mont., for 1912.

[E. O. Walters, observer.]

Day.	June.		July.		August.		September.		October.		November.	
	Gage height.	Dis-charge.	Gage height.	Dis-charge.	Gage height.	Dis-charge.	Gage height.	Dis-charge.	Gage height.	Dis-charge.	Gage height.	Dis-charge.
1.....			1.1	12	1.6	13	1.75	9.5	1.7	8.5	1.3	2.8
2.....			1.1	12	1.6	13	1.75	9.5	1.6	6.8	1.3	2.8
3.....			1.1	12	1.6	13	1.75	9.5	1.6	6.8	1.2	1.8
4.....			1.15	12	1.5	10	1.75	9.5	1.55	6.0	1.2	1.8
5.....			1.2	14	1.5	10	1.75	9.5	1.5	5.2	1.2	1.8
6.....			.95	8.6	1.5	10	1.75	9.5	1.45	4.6	1.15	1.3
7.....			.95	8.6	1.5	9.3	1.75	9.5	1.3	2.8	1.1	.8
8.....			1.2	14	1.5	9.3	1.75	9.5	1.3	2.8	1.1	.8
9.....			1.1	10	1.5	9.3	1.75	9.5	1.3	2.8	1.1	.8
10.....			1.1	10	1.5	8.5	1.75	9.5	1.3	2.8	1.1	.8
11.....			1.1	10	1.7	12	1.75	9.5	1.3	2.8	1.1	.8
12.....			1.1	9.5	1.65	11	1.7	8.5	1.3	2.8	1.1	.8
13.....			1.05	8.5	1.7	12	1.65	7.6	1.3	2.8	1.1	.8
14.....			1.15	10	1.7	11	1.6	6.8	1.3	2.8	1.1	.8
15.....			1.5	17	1.7	11	1.8	10	1.3	2.8	1.1	.8
16.....			1.6	20	1.5	7.8	1.7	8.5	1.3	2.8	1.1	.8
17.....			1.25	12	1.55	8.5	1.7	8.5	1.3	2.8		
18.....			1.1	7.8	1.55	7.8	1.7	8.5	1.3	2.8		
19.....			1.45	15	1.55	7.8	1.7	8.5	1.3	2.8		
20.....			1.4	14	1.55	7.8	1.65	7.6	1.3	2.8		
21.....			1.5	15	1.55	7.8	1.65	7.6	1.3	2.8		
22.....			1.5	15	1.55	6.8	1.55	6.0	1.3	2.8		
23.....			1.5	15	1.55	6.8	1.6	6.8	1.3	2.8		
24.....			1.55	15	1.55	6.8	1.6	6.8	1.3	2.8		
25.....	0.8	6.0	1.55	15	1.6	7.0	1.6	6.8	1.3	2.8		
26.....	1.0	9.5	1.5	13	1.6	7.0	1.6	6.8	1.3	2.8		
27.....	1.1	12	1.4	11	1.75	9.5	1.7	8.5	1.3	2.8		
28.....	1.5	21	1.6	16	1.75	9.5	1.7	8.5	1.3	2.8		
29.....	1.1	12	1.6	15	1.7	8.5		8.5	1.3	2.8		
30.....	1.1	12	1.6	15	1.7	8.5		8.5	1.3	2.8		
31.....			1.6	15	1.7	8.5			1.3	2.8		

NOTE.—Daily discharge determined as follows: June 25 to July 8, from a fairly well-defined rating curve; July 9 to Aug. 26, by shifting channel methods; Aug. 27 to Nov. 16, from a poorly defined rating curve. The canal was dry previous to June 25. Discharge interpolated Sept. 29 and 30.

Monthly discharge of Fort Belknap canal near Chinook, Mont., for 1912.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accu- racy.
	Maximum.	Minimum.	Mean.		
June 25-30.....	21	.0	12.1	144	B.
July.....	20	7.8	12.8	787	C.
August.....	13	6.8	9.32	573	C.
September.....	10	6.0	8.46	503	C.
October.....	8.5	2.8	3.48	214	C.
November 1-16.....	2.8	.8	1.27	40.3	C.
The period.....				2,260	

LITTLE PORCUPINE CREEK BASIN.

LITTLE PORCUPINE CREEK AT FRAZER, MONT.

Location.—In SE. $\frac{1}{4}$ NE. $\frac{1}{4}$ sec. 28, T. 27 N., R. 44 E., above the intake of the reservoir, about $1\frac{1}{2}$ miles above the site of the station maintained from 1908 to 1910 and about one-half mile north of Frazer.

Records available.—July 13, 1908, to September 30, 1910, at the original station; April 14, 1911, to December 31, 1912, at present site.

Drainage area.—Not measured.

Gage.—Staff; and about 2 miles farther upstream than that originally used.

Channel.—Shifting. On the date on which the station was reestablished in 1911 the channel was dry at the new gage but the stream was discharging 0.3 second-foot at the old gage, the water coming from springs near the gage.

Discharge measurements.—Made by wading.

Accuracy.—Results are only fair.

Discharge measurements of Little Porcupine Creek at Frazer, Mont., in 1912.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		<i>Feet.</i>	<i>Sec.-ft.</i>			<i>Feet.</i>	<i>Sec.-ft.</i>
Apr. 14	B. E. Jones.....	4.84	148	July 11	R. R. Randell.....	3.55	0.32
May 28	R. R. Randell.....	4.02	35	Sept. 4	do.....	3.66	7.7
June 22	do.....	3.55	1.0				

Daily gage height, in feet, of Little Porcupine Creek at Frazer, Mont., for 1912.

[D. Martin and W. Ivey, observers.]

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1.....		3.75	4.65		2.75	3.65	3.51	3.56
2.....		4.05	4.55		2.75	3.7	3.51	3.56
3.....		3.95	3.8		2.8	3.6	3.53	3.56
4.....		4.1	3.6		2.75	3.55	3.53	3.56
5.....		4.05	3.35		2.75	3.67	3.56	3.56
6.....		4.25	3.35		2.75	3.66	3.56	3.56
7.....		4.4	3.25		2.75	3.66	3.56	3.56
8.....		4.4	3.25		2.8	3.68	3.56	3.56
9.....		4.3	3.25		3.75	3.70	3.56	3.56
10.....		4.05	3.2		2.75	3.66	3.56
11.....		3.95	3.25		2.75	3.64	3.56
12.....	5.0	3.95	3.2		2.75	3.63	3.56
13.....	4.8	3.95	3.25		2.9	3.61	3.56
14.....	4.6	4.0	3.25		2.85	3.6	3.56
15.....	4.4	3.85	3.25		2.85	3.61	3.56
16.....	4.3	3.75	3.45		2.85	3.61	3.56
17.....	4.2	3.55	3.4	3.45	2.9	3.61	3.56
18.....	4.0	3.45	3.45	3.45	3.1	3.61	3.56
19.....	3.9	3.5		3.3	4.45	3.61	3.56
20.....	3.9	3.45		3.25		3.61	3.56
21.....	3.9	3.85		3.15		3.61	3.56
22.....	3.85	4.15	3.55	3.15		3.64	3.56
23.....	3.85	4.05	3.5	3.2	4.85	3.66	3.56
24.....	3.8	4.0	3.4	3.2	4.4	3.66	3.56
25.....	3.75	3.75	3.4	3.25	3.95	3.62	3.56
26.....	3.75	3.75	3.35	3.05	4.0	3.56	3.56
27.....	3.75	3.75	3.3	3.05	3.9	3.54	3.56
28.....	3.75	4.3	3.25	3.05	3.85	3.52	3.60
29.....	3.8		3.25	3.0	3.85	3.60	3.60
30.....	3.75	5.0	3.25	2.85	3.8	3.6	3.56
31.....		4.95		2.75	3.7		3.56

NOTE.—The ice went out about Apr. 3. The maximum gage height as determined from flood marks was 7 feet, and probably occurred about Apr. 5. From this time to Apr. 12 the stream probably fell gradually. The water was over the gage on May 29 and Aug. 20-22.

Daily discharge, in second-feet, of Little Porcupine Creek at Frazer, Mont., for 1912.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1.....		14	118		0	6.8	.2	1.5
2.....		39	104		0	10	.2	1.5
3.....		30	17		0	3.5	.6	1.5
4.....		44	3.5		0	1.0	.6	1.5
5.....		39	0		0	8.0	1.5	1.5
6.....		62	0		0	7.4	1.5	1.5
7.....		82	0		0	7.4	1.5	1.5
8.....		82	0		0	8.7	1.5	1.5
9.....		68	0		0	10	1.5	1.5
10.....		39	0		0	7.4	1.5	
11.....		30	0	0.3	0	6.1	1.5	
12.....	171	30	0		0	5.4	1.5	
13.....	141	30	0		0	4.2	1.5	
14.....	111	34	0		0	3.5	1.5	
15.....	82	21	0		0	4.2	1.5	
16.....	68	14	0		0	4.2	1.5	
17.....	55	1	0	0	0	4.2	1.5	
18.....	34	0	0	0	0	4.2	1.5	
19.....	25	0	.3	0	89	4.2	1.5	
20.....	25	0	.4	0	270	4.2	1.5	
21.....	25	21	.7	0	420	4.2	1.5	
22.....	21	50	1.0	0	220	6.1	1.5	
23.....	21	39	0	0	148	7.4	1.5	
24.....	17	34	0	0	82	7.4	1.5	
25.....	14	14	0	0	30	4.8	1.5	
26.....	14	14	0	0	34	1.5	1.5	
27.....	14	14	0	0	25	.8	1.5	
28.....	14	68	0	0	21	.4	3.5	
29.....	17	450	0	0	21	3.5	3.5	
30.....	14	171	0	0	17	3.5	1.5	
31.....		164		0	10		1.5	

NOTE.—Daily discharge determined from a rating curve fairly well-defined for gage heights from 3.65 feet to 5 feet and poorly-defined at other stages. Daily discharge estimated May 29, June 19-21, and Aug. 20-22. Stream practically dry June 5 to Aug. 18.

Monthly discharge of Little Porcupine Creek at Frazer, Mont., for 1912.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accu- racy.
	Maximum.	Minimum.	Mean.		
April 12-30.....	^a 171	14	46.5	1,750	B.
May.....	450	0	54.8	3,370	B.
June.....	118	0	8.16	486	B.
July.....			(^b)		C.
August.....	420	0	44.7	2,750	C.
September.....	10	.4	5.14	306	C.
October.....	3.5	.2	1.49	92	C.
November 1-9.....	1.5	1.5	1.50	27	C.
The period.....				8,780	

^a Maximum discharge, which probably occurred on April 5, obtained by applying highwater mark to open channel rating curve, is 500 second-feet.

^b Practically dry from June 5 to Aug. 18.

WOLF CREEK BASIN.

WOLF CREEK NEAR WOLF POINT, MONT.

Location.—In the SE. $\frac{1}{4}$ SW. $\frac{1}{4}$ sec. 8, T. 27 N., R. 47 E., at William Smith's ranch, $2\frac{1}{2}$ miles northwest of Wolf Point, Mont.

Records available.—August 15, 1908, to December 31, 1912.

Drainage area.—Not measured.

Gage.—A staff near the house of the observer.

Channel.—Shifting.

Discharge measurements.—Made by wading near the gage.

Diversions.—A small irrigation ditch diverts water above the gage.

Accuracy.—The gage-height records for 1912 are poor. Otherwise results obtained are fair.

Discharge measurements of Wolf Creek near Wolf Point, Mont., in 1912.

Date.	Hydrographer.	Gage height.	Dis-charge.	Date.	Hydrographer.	Gage height.	Dis-charge.
		<i>Feet.</i>	<i>Sec.-ft.</i>			<i>Feet.</i>	<i>Sec.-ft.</i>
Apr. 15	B. E. Jones.....	3.18	59	July 11	R. R. Randell.....	2.32	^b 7.1
May 29	R. R. Randell.....	3.11	44	Sept. 5do.....	2.28	5.3
June 22do.....	1.97	^a 2.6				

^a Discharge of Wolf Creek ditch, 1.0 second-foot.

^b Discharge of Wolf Creek ditch, 0.8 second-foot.

Daily gage height, in feet, of Wolf Creek near Wolf Point, Mont., for 1912.

[W. H. Smith, observer.]

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1.....	5.9	3.0		1.6				
2.....			3.0			2.3		
3.....								
4.....				2.0			2.0	
5.....						2.3		
6.....				2.2				
7.....	5.2	2.5				2.2		
8.....								
9.....	4.9							2.1
10.....			2.6			2.1		
11.....	4.0			2.3				
12.....								
13.....		2.4	2.0					
14.....				2.4				
15.....	3.2			2.0				
16.....					2.0			
17.....	3.0							
18.....								
19.....	3.6							
20.....				2.0	2.8			
21.....	3.4							
22.....			2.0				2.1	
23.....	3.2							
24.....								
25.....								
26.....		2.5						
27.....								
28.....	3.0	3.3		1.8				
29.....		3.1						
30.....								
31.....								

Daily discharge, in second-feet, of Wolf Creek near Wolf Point, Mont., for 1912.

Day.	Apr.	May	June.	July.	Aug.	Sept.	Oct.	Nov.
1.....	270	42		0.4				
2.....			37			5.6		
3.....								
4.....				3.0			2.0	
5.....						5.6		
6.....				5.4				
7.....	214	15				4.2		
8.....								
9.....	190							3.0
10.....			16			3.0		
11.....	119			6.9				
12.....								
13.....		11	3.0					
14.....				7.5				
15.....	59			2.0				
16.....				3.0	2.0			
17.....	46							
18.....								
19.....	91							
20.....				2.0	20			
21.....	74							
22.....			3.0				3.0	
23.....	58							
24.....								
25.....								
26.....		14						
27.....								
28.....	44	61		.5				
29.....		44						
30.....								
31.....								

NOTE.—Daily discharge determined as follows: Apr. 1-11 from a poorly defined rating curve; Apr. 15 to May 28, by shifting channel methods; May 29 to July 11 from a fairly well-defined rating curve; July 12 to Nov. 9, from a poorly defined rating curve.

POPLAR RIVER BASIN.

POPLAR RIVER NEAR POPLAR, MONT.

Location.—At the United States reclamation camp in the SW. $\frac{1}{4}$ SE. $\frac{1}{4}$ sec. 5, T. 21 N., R. 51 E., 12 miles upstream from the station formerly maintained at Buerchia's ranch, 6 miles north of Poplar, Mont.

Records available.—August 15, 1908, to May 1, 1911, at old site; May 2, 1911, to December 31, 1912, at present site.

Drainage area.—Not measured.

Gage.—Staff on right bank; datum unchanged at new station.

Channel.—Shifts.

Discharge measurements.—Made by wading.

Winter flow.—Affected by ice.

Discharge measurements of Poplar River near Poplar, Mont., in 1912.

Date.	Hydrographer.	Gage height.	Dis-charge.	Date.	Hydrographer.	Gage height.	Dis-charge.
Apr. 16	B. E. Jones.....	<i>Feet.</i> 6.12	<i>Sec.-ft.</i> a 823	July 9	R. R. Randell.....	<i>Feet.</i> 4.62	<i>Sec.-ft.</i> 162
May 31	R. R. Randell.....	5.14	332	Sept. 6do.....	4.14	72
June 23do.....	4.34	101				

a Made at bridge in Poplar 18 miles below gage. Gage height 6.12 at 1.30 p. m.; measurement made at from 4 to 6 p. m.; stream falling very fast.

Daily gage height, in feet, of Poplar River near Poplar, Mont., for 1912.

[F. Krauth, observer.]

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Day.	Apr.	May.	June.	July.	Aug.	Sept.
1.....		4.85	5.25	4.1	4.05	4.15	16.....	6.1	4.95	4.6	4.5	4.0	4.05
2.....		4.85	5.25	5.2	4.0	4.15	17.....	6.2	4.85	4.6	4.45	4.05	4.05
3.....		5.05	5.05	4.6	4.0	4.1	18.....	6.2	4.8	4.55	4.4	4.05	4.0
4.....		5.3	4.95	4.9		4.1	19.....	6.2	4.7	4.5	4.3	4.75	4.0
5.....		6.0	4.9	5.2	4.0	4.1	20.....	6.0	4.7	4.5	4.3	5.15	4.0
6.....		6.4	4.8	4.75	4.0	4.1	21.....	6.0	4.65		4.2	5.05	4.0
7.....		6.4	4.75	4.7	3.95	4.15	22.....	5.8	4.75	4.4	4.3	4.75	4.0
8.....		6.2	4.7	4.65	3.95	4.1	23.....	5.6	4.8	4.35	4.3	4.65	4.0
9.....		5.8	4.65	4.6	3.9	4.1	24.....	5.4	4.75	4.3	4.2	4.6	4.0
10.....		5.5	4.65	4.6	3.9	4.1	25.....	5.3	4.7	4.25	4.25	4.5	4.0
11.....		5.3	4.6	4.6	3.9	4.1	26.....	5.25	4.65	4.2	4.2	4.4	4.0
12.....		5.2	4.55	4.6	3.9	4.1	27.....	5.1	4.8	4.1	4.15	4.35	
13.....		5.15	4.5	4.55	3.9	4.05	28.....	5.0	5.0	4.05	4.15	4.3	
14.....		5.1	4.5	4.55	3.9	4.05	29.....	5.0	5.05	4.0	4.1	4.3	4.0
15.....		5.0	4.65		3.85	4.05	30.....	4.9	5.1	4.05	4.1	4.25	4.0
							31.....		5.1		4.1	4.2	

NOTE.—The gage was washed out during the high water the first part of April and not replaced until Apr. 16. The maximum gage height as determined from flood marks was 11.1 feet and probably occurred about Apr. 10. The maximum gage height at the old station at Obershaw's ranch was 12 feet.

Daily discharge, in second-feet, of Poplar River near Poplar, Mont., for 1912.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Day.	Apr.	May.	June.	July.	Aug.	Sept.
1.....		230	380	68	61	75	16.....	820	262	160	138	54	61
2.....		230	380	360	54	75	17.....	880	230	160	128	61	61
3.....		300	300	160	54	68	18.....	880	215	149	118	61	54
4.....		400	262	245	54	68	19.....	880	185	138	100	200	54
5.....		760	245	360	54	68	20.....	760	185	138	100	340	54
6.....		1,000	215	200	54	68	21.....	760	172	128	82	300	54
7.....		1,000	200	185	47	75	22.....	650	200	118	100	200	54
8.....		880	185	172	47	68	23.....	540	215	109	100	172	54
9.....		650	172	160	40	68	24.....	445	200	100	82	160	54
10.....		490	172	160	40	68	25.....	400	185	91	91	138	54
11.....		400	160	160	40	68	26.....	380	172	82	82	118	54
12.....		360	149	160	40	68	27.....	320	215	68	75	109	54
13.....		340	138	149	40	61	28.....	280	280	61	75	100	54
14.....		320	138	149	40	61	29.....	280	300	54	68	100	54
15.....		280	172	149	35	61	30.....	245	320	61	68	91	54
							31.....		320		68	82	

NOTE.—Daily discharge determined from a well defined rating curve. Discharge interpolated for days for which gage heights are missing.

A measurement was made on Apr. 12, at a gage height of 8.05 at the old station at Obershaw's ranch and the discharge was found to be 3,380 second-feet. Using the old rating curve for Obershaw's in connection with this measurement and the maximum gage height of 12 feet at Obershaw's a maximum discharge of 10,000 second-feet is obtained.

Monthly discharge of Poplar River near Poplar, Mont., for 1912.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accu- racy.
	Maximum.	Minimum.	Mean.		
April 16-30.....	a 880	245	568	16,900	A.
May.....	1,000	172	364	22,400	A.
June.....	380	54	163	9,700	A.
July.....	360	68	139	8,550	A.
August.....	340	35	96.3	5,920	A.
September.....	75	54	61.5	3,660	A.
The period.....				67,100	

a Maximum discharge estimated at 10,000 second-feet. See footnote to daily gage heights and discharge.

BIG MUDDY CREEK BASIN.

BIG MUDDY CREEK NEAR CULBERTSON, MONT.

Location.—In the SW. $\frac{1}{4}$ sec. 17, T. 29 N., R. 54 E., at Gustave Sholtz's ranch, 11 miles above the mouth of the stream and 8 miles above the site of the original station, which was discontinued because gage heights were affected by back-water from the Missouri.

Records available.—July 14, 1908, to July 19, 1909, at original station; July 19, 1909, to December 31, 1912, at present station.

Gage.—An inclined rod on left bank of stream near residence of observer; datum unchanged.

Channel.—Mud.

Discharge measurements.—Made by wading.

Winter flow.—Little if any flow during months of January, February, October, November, and December.

Accuracy.—Results at new station are good.

Discharge measurements of Big Muddy Creek near Culbertson, Mont., in 1912.

Date.	Hydrographer.	Gage height.	Dis-charge.	Date.	Hydrographer.	Gage height.	Dis-charge.
		<i>Feet.</i>	<i>Sec.-ft.</i>			<i>Feet.</i>	<i>Sec.-ft.</i>
Apr. 11	B. F. Jones.....	10.53	^a 1,100	July 12	R. R. Randell.....	2.93	15.7
May 26	R. R. Randell.....	3.28	63	Sept. 3do.....	2.83	18.4
June 19do.....	3.83	73				

^a Made at bridge 8 miles below gage. No tributaries between bridge and gage.

Daily gage height, in feet, of Big Muddy Creek near Culbertson, Mont., for 1912.

[By Thos. Shields, observer.]

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1.....	4.6	3.05	6.8	3.25	2.7	3.0	2.28	2.31
2.....	6.9	3.05	7.4	3.05	2.7	2.95	2.29	2.31
3.....	9.0	3.0	6.7	2.95	2.65	2.83	2.29	2.31
4.....		3.15	6.6	3.05	2.6	2.79	2.31	2.31
5.....		3.55	4.9	3.25	2.6	2.74	2.31	2.31
6.....		3.8	4.5	3.25	2.5	2.69	2.30	2.33
7.....		4.4	4.15	3.05	2.5	2.64	2.29	2.35
8.....		5.4	3.95	3.05	2.5	2.59	2.30	2.35
9.....		5.8	3.45	2.95	2.35	2.67	2.31	2.40
10.....		6.4	3.35	2.95	2.45	2.55	2.31	2.42
11.....	10.5	6.7	3.15	2.95	2.4	2.40	2.29	2.42
12.....	10.5	6.4	3.05	2.95	2.4	2.38	2.29	2.42
13.....	10.0	5.5	3.0	2.95	2.4	2.40	2.30	2.42
14.....	9.6	4.6	3.0	2.9	2.4	2.4	2.29	2.31
15.....	8.9	3.75	3.25	2.9	2.4	2.40	2.27	2.31
16.....	7.6	3.55	4.15	2.9	2.4	2.38	2.27	2.31
17.....	6.7	3.35	4.15	3.15	2.4	2.35	2.27
18.....	6.2	3.15	3.95	3.25	2.4	2.35	2.31
19.....	5.7	3.05	3.85	3.3	2.6	2.35	2.40
20.....	5.2	2.95	4.05	3.35	2.8	2.31	2.35
21.....	4.8	2.95	4.25	3.4	2.8	2.31	2.35
22.....	4.5	2.95	4.4	3.4	2.75	2.31	2.4
23.....	4.3	3.15	4.25	3.35	2.7	2.29	2.4
24.....	4.15	3.1	4.05	3.35	2.6	2.29	2.4
25.....	3.85	3.15	3.85	3.25	2.5	2.29	2.4
26.....	3.65	3.15	3.75	3.15	2.4	2.29	2.35
27.....	3.35	3.35	3.65	3.05	2.8	2.29	2.35
28.....	3.25	3.65	3.55	3.05	2.95	2.28	2.31
29.....	3.15	3.85	3.45	2.95	3.0	2.28	2.31
30.....	3.05	3.95	2.95	3.05	2.29	2.31
31.....	4.3	2.8	3.0	2.31

NOTE.—Water over the top of the gage Apr. 4-10; temporary high-water gage was set Apr. 11.

Daily discharge, in second-feet, of Big Muddy Creek near Culbertson, Mont., for 1912.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1.....	175	53	430	36	11	23	0.8	1.2
2.....	479	53	520	26	11	20	.9	1.2
3.....	830	50	420	20	10	15	.9	1.2
4.....		59	400	26	8	14	1.2	1.2
5.....		84	185	36	8	12	1.2	1.2
6.....		104	145	36	5	11	1.0	1.6
7.....		156	115	26	5	9.2	.9	2.0
8.....		268	98	26	5	7.7	1.0	2.0
9.....		319	60	20	2	10	1.2	3.0
10.....		401	54	20	4	6.5	1.2	3.4
11.....	1,100	447	42	20	3	3.0	.9	3.4
12.....	1,100	401	36	20	3	2.6	.9	3.4
13.....	1,010	280	30	20	3	3.0	1.0	3.4
14.....	938	175	30	18	3	3.0	.9	1.2
15.....	812	100	44	18	3	3.0	.7	1.2
16.....	591	84	106	18	3	2.6	.7	1.2
17.....	447	71	106	30	3	2.0	.7
18.....	373	59	86	36	3	2.0	1.2
19.....	306	53	74	39	8	2.0	3.0
20.....	244	47	90	42	14	1.2	2.0
21.....	196	47	106	45	14	1.2	2.0
22.....	165	47	118	45	12	1.2	3.0
23.....	147	59	106	42	11	.9	3.0
24.....	134	56	90	42	8	.9	3.0
25.....	108	59	74	36	5	.9	3.0
26.....	92	59	68	30	3	.9	2.0
27.....	71	64	60	26	14	.9	2.0
28.....	65	86	54	26	20	.8	1.2
29.....	59	102	48	20	23	.8	1.2
30.....	53	106	42	20	26	.9	1.2
31.....		140	14	23	1.2

NOTE.—Daily discharge determined as follows: Apr. 1 to May 26, from a fairly well-defined rating curve; May 27 to June 18, by shifting channel methods; June 19 to Nov. 16, from a fairly well-defined rating curve. Discharge Apr. 4–10 estimated at 1,000 second-feet.

Monthly discharge of Big Muddy River near Culbertson, Mont., for 1912.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accu- racy.
	Maximum.	Minimum.	Mean.		
April.....	^a 1,100	53	550	32,700	B.
May.....	447	47	132	8,120	B.
June.....	520	30	128	7,620	C.
July.....	45	14	28.4	1,750	B.
August.....	26	2	8.84	544	B.
September.....	23	.8	5.41	322	B.
October.....	3.0	.7	1.45	89.2	B.
November 1–16.....	3.4	1.2	1.99	63.2	B.
The period.....				51,200	

^a The maximum stage was reached on April 11, at the time of the measurement and not during the period when the gage was not read.

YELLOWSTONE RIVER BASIN.

YELLOWSTONE RIVER AT CORWIN SPRINGS, MONT.

Location.—In the NE. $\frac{1}{4}$ sec. 30, T. 8 S., R. 8 E., in the canyon at Corwin Springs, Mont., 8 miles below Gardiner, the northern entrance to Yellowstone National Park.

Records available.—September 2, 1910, to December 31, 1912.

Drainage area.—2,630 square miles.

Gage.—A chain gage fastened to the floor of a highway bridge on the downstream side near the right bank. Previous to October 25, 1911, a staff gage set to the same datum and fastened to a pile beside the concrete abutment on the right bank was read.

Channel.—Bed of stream rocky; free from vegetation.

Discharge measurements.—Made from the lower side of highway bridge.

Diversions.—No water is diverted from the Yellowstone above this station.

Storage.—Yellowstone Lake furnishes natural but uncontrolled regulation of the flow.

Discharge measurements of Yellowstone River at Corwin Springs, Mont., in 1912.

Date.	Hydrographer.	Gage height.	Dis-charge.
Jan. 29	E. D. Gardner.....	Feet.	Sec.-ft.
July 19	R. R. Randell.....	^a 1.20	1,140
		5.67	8,440

^a Ice present.

Daily gage height, in feet, of Yellowstone River at Corwin Springs, Mont., for 1912.

[C. H. Wilks, jr., observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1.....	1.3	1.1	1.0	1.1	1.4	6.5	4.8	3.0	2.0	1.6	1.2
2.....	1.2	1.1	1.0	1.1	1.3	6.3	4.9	3.4	2.2	1.6	1.1
3.....	1.3	1.1	1.0	1.1	1.3	6.2	4.6	3.1	2.2	1.5	1.2
4.....	1.3	1.2	1.0	1.2	1.3	6.1	4.6	2.9	2.1	1.6	1.2
5.....	1.5	1.2	1.0	1.2	1.3	6.7	5.9	4.3	3.0	2.5	1.6	1.1
6.....	1.4	1.2	1.0	1.1	1.3	7.1	5.8	4.3	3.0	2.5	1.7	1.2
7.....	1.6	1.2	1.0	1.1	1.3	7.0	6.0	4.2	2.9	2.4	1.6	1.2
8.....	1.6	1.2	1.0	1.2	1.4	7.8	5.9	4.2	2.7	2.3	1.7	1.2
9.....	1.7	1.2	1.1	1.2	1.7	7.7	5.6	3.9	2.8	2.4	1.7	1.1
10.....	1.4	1.2	1.1	1.3	2.1	8.4	5.5	4.0	2.7	2.2	1.7	1.2
11.....	1.2	1.1	1.1	1.3	2.4	7.5	5.5	3.9	2.6	2.1	1.8	1.2
12.....	1.3	1.1	1.1	1.3	2.2	7.1	5.5	3.7	2.7	2.2	1.1
13.....	1.2	1.1	1.1	1.3	2.0	7.9	5.4	3.7	2.6	2.2	1.2
14.....	1.1	1.1	1.2	2.0	7.7	5.7	3.6	2.6	2.1	1.7	1.2
15.....	1.2	1.2	1.1	1.2	2.0	6.9	5.5	3.5	2.5	2.1	1.6	1.0
16.....	1.2	1.2	1.1	1.2	2.7	6.3	5.2	3.7	2.5	2.1	1.6	1.0
17.....	1.2	1.2	1.1	1.2	3.4	6.0	5.2	3.7	2.5	2.1	1.5	.9
18.....	1.2	1.2	1.1	1.2	4.1	5.8	5.1	3.7	2.3	2.0	1.5	.9
19.....	1.2	1.2	1.1	1.2	4.6	5.9	5.7	3.6	2.4	2.0	1.4	.8
20.....	1.3	1.1	1.1	1.2	4.8	6.5	5.8	3.6	2.4	1.9	1.4	.9
21.....	1.2	1.1	1.1	1.2	4.5	7.1	5.4	3.5	2.3	1.7	1.4	.9
22.....	1.2	1.1	1.1	1.2	4.0	7.4	5.7	3.3	2.4	1.8	1.3	.9
23.....	1.2	1.1	1.1	1.2	3.5	7.7	5.2	3.4	2.4	1.8	1.4	1.1
24.....	1.2	1.1	1.1	1.2	7.9	5.0	3.3	2.3	1.7	1.4
25.....	1.2	1.1	1.1	1.2	7.7	4.8	3.1	2.4	1.8	1.2
26.....	1.2	1.1	1.1	1.2	7.3	4.7	3.2	2.3	1.8	1.3
27.....	1.2	1.1	1.1	1.3	7.3	4.8	3.2	2.2	2.0	1.3
28.....	1.2	1.1	1.1	1.3	7.2	4.6	3.3	2.1	1.9	1.3
29.....	1.2	1.0	1.1	1.3	6.8	4.4	3.3	2.2	2.0	1.2
30.....	1.1	1.2	1.3	6.6	4.4	3.2	2.1	1.9	1.3
31.....	1.1	1.1	4.4	3.1	1.7

NOTE.—Relation of gage height to discharge, December 23, affected by ice. Gage stolen May 24 and replaced June 4.

Daily discharge, in second-feet, of Yellowstone River at Corwin Springs, Mont., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1.....	1,230	1,100	1,040	1,100	1,300	10,800	6,210	2,900	1,800	1,450	1,160
2.....	1,160	1,100	1,040	1,100	1,230	10,200	6,450	3,470	1,990	1,450	1,100
3.....	1,230	1,100	1,040	1,100	1,230	9,870	5,740	3,030	1,990	1,370	1,160
4.....	1,230	1,160	1,040	1,160	1,230	9,580	5,740	2,770	1,890	1,450	1,160
5.....	1,370	1,160	1,040	1,160	1,230	11,400	9,030	5,090	2,900	2,300	1,450	1,100
6.....	1,300	1,160	1,040	1,100	1,230	12,600	8,760	5,090	2,900	2,300	1,530	1,160
7.....	1,450	1,160	1,040	1,100	1,230	12,300	9,300	4,890	2,770	2,190	1,450	1,160
8.....	1,450	1,160	1,040	1,160	1,300	14,800	9,030	4,890	2,530	2,090	1,530	1,160
9.....	1,530	1,160	1,100	1,160	1,530	14,500	8,230	4,310	2,650	2,190	1,530	1,100
10.....	1,300	1,160	1,100	1,230	1,890	16,700	7,970	4,500	2,530	1,990	1,530	1,160
11.....	1,160	1,100	1,100	1,230	2,190	13,800	7,970	4,310	2,410	1,890	1,620	1,160
12.....	1,230	1,100	1,100	1,230	1,990	12,600	7,970	3,960	2,530	1,990	1,590	1,100
13.....	1,160	1,100	1,100	1,230	1,800	15,100	7,710	3,960	2,410	1,990	1,560	1,160
14.....	1,160	1,100	1,100	1,230	1,800	14,500	8,490	3,790	2,410	1,890	1,530	1,160
15.....	1,160	1,160	1,100	1,160	1,800	12,000	7,970	3,630	2,300	1,890	1,450	1,040
16.....	1,160	1,160	1,100	1,160	2,530	10,200	7,200	3,960	2,300	1,890	1,450	1,040
17.....	1,160	1,160	1,100	1,160	3,470	9,300	7,200	3,960	2,300	1,890	1,370	990
18.....	1,160	1,160	1,100	1,160	4,690	8,760	6,950	3,960	2,090	1,800	1,370	990
19.....	1,160	1,160	1,100	1,160	5,740	9,030	8,490	3,790	2,190	1,800	1,300	950
20.....	1,230	1,100	1,100	1,160	6,210	10,800	8,760	3,790	2,190	1,710	1,300	990
21.....	1,160	1,100	1,100	1,160	5,520	12,600	7,710	3,630	2,090	1,530	1,300	990
22.....	1,160	1,100	1,100	1,160	4,500	13,500	8,490	3,320	2,190	1,620	1,230	990
23.....	1,160	1,100	1,100	1,160	3,630	14,500	7,200	3,470	2,190	1,620	1,300	990
24.....	1,160	1,100	1,100	1,160	15,100	6,700	3,320	2,090	1,530	1,300
25.....	1,160	1,100	1,100	1,160	14,500	6,210	3,030	2,190	1,620	1,160
26.....	1,160	1,100	1,100	1,160	13,200	5,970	3,170	2,090	1,620	1,230
27.....	1,160	1,100	1,100	1,230	13,200	6,210	3,170	1,990	1,800	1,230
28.....	1,160	1,100	1,100	1,230	12,900	5,740	3,320	1,890	1,710	1,230
29.....	1,160	1,040	1,100	1,230	11,700	5,300	3,320	1,990	1,800	1,160
30.....	1,100	1,160	1,230	11,100	5,300	3,170	1,890	1,710	1,230
31.....	1,100	1,100	5,300	3,030	1,530

NOTE.—Daily discharge determined from a well-defined rating curve. Discharge interpolated Jan. 14 and estimated Dec. 23.

Monthly discharge of Yellowstone River at Corwin Springs, Mont., for 1912.

[Drainage area, 2,630 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
January.....	1,530	1,100	1,210	0.460	0.53	74,400	B ^a
February.....	1,160	1,040	1,120	.426	.46	64,400	B ^a
March.....	1,160	1,040	1,090	.414	.48	67,000	B ^a
April.....	1,230	1,100	1,170	.445	.50	69,600	A.
May 1-23.....	6,210	1,230	2,580	.981	.84	118,000	A.
June 5-30.....	16,700	8,760	12,700	4.83	4.67	655,000	A.
July.....	10,800	5,300	7,790	2.96	3.41	479,000	A.
August.....	6,450	3,030	4,130	1.57	1.81	254,000	A.
September.....	3,470	1,890	2,410	.916	1.02	143,000	A.
October.....	2,300	1,530	1,860	.707	.82	114,000	A.
November.....	1,620	1,160	1,390	.529	.59	82,700	A.
December 1-23.....	1,160	950	1,090	.414	.35	49,700	A.
The period.....	2,170,000

^a Accuracy reduced during winter months on account of the possibility of ice affecting the results.

YELLOWSTONE RIVER AT HUNTLEY, MONT.

Location.—In the SW. $\frac{1}{4}$ sec. 24, T. 2 N., R. 27 E., at the new steel highway bridge, 1 mile below Huntley, Mont., 1 mile below Pryor Creek.

Records available.—October 1, 1907, to December 31, 1912. A station was maintained May 10, 1906, to December 31, 1907, at Junction, Mont., where the flow is practically the same as at Huntley.

Drainage area.—12,000 square miles.

Gage.—Chain fastened to bridge rail; datum unchanged.

Channel.—Shifts.

Discharge measurements.—Made from downstream side of bridge.

Winter flow.—River frozen entirely over in places during the winter, but during the coldest seasons open channels with floating ice are not of uncommon occurrence.

Divisions.—The Huntley canal, built by the United States Reclamation Service, takes water from the river about 2 miles above the gaging station; its normal capacity is 400 second-feet, and it supplies the water for 29,000 acres of land. Near Laurel are the headgates of the Billings Land & Irrigation Co.'s canal, which carries about 305 second-feet and irrigates 28,000 acres. Many small ditches take water from the tributaries of the Yellowstone, but few from the stream itself, owing to the variation of the stage of the water surface and consequent difficulty of diversion.

Accuracy.—Conditions for obtaining accurate data at this station are only fair and many discharge measurements are necessary to define a good rating curve.

Discharge measurements of Yellowstone River at Huntley, Mont., in 1912.

Date.	Hydrographer.	Gage height.	Discharge.
Apr. 10	W. A. Lamb.....	<i>Feet.</i> 2.15	<i>Sec.-ft.</i> 3,560
May 21do.....	5.92	19,100
Aug. 22	R. R. Randell.....	3.47	8,320
Oct. 23do.....	2.80	5,440

Daily gage height, in feet, of Yellowstone River at Huntley, Mont., for 1912.

[Arthur Foster, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1.....	2.0	4.1	3.2	2.5	2.5	6.8	8.0	4.8	3.2	3.0	3.0	2.3
2.....	2.1	4.0	3.2	2.5	2.6	6.8	8.6	4.9	3.2	3.0	3.0	2.3
3.....	2.3	4.0	3.3	2.7	2.7	7.2	8.2	5.1	3.2	3.0	2.9	2.2
4.....	3.1	3.9	3.3	2.8	2.7	7.8	7.6	5.0	3.2	3.0	2.9	2.2
5.....	3.4	3.9	3.4	2.5	2.7	7.9	7.3	4.7	3.3	3.1	2.9	2.1
6.....	3.5	3.9	3.5	2.5	2.6	8.0	7.2	4.7	3.2	3.5	2.8	2.1
7.....	3.7	3.9	3.5	2.3	2.5	8.2	7.0	4.4	3.2	3.8	2.8	2.1
8.....	3.7	3.9	3.4	2.1	2.7	8.5	7.0	4.3	3.2	3.8	2.7	2.1
9.....	3.9	3.8	3.3	2.1	2.8	8.9	6.7	4.3	3.2	3.9	2.8	2.3
10.....	4.2	3.7	3.3	2.3	2.9	9.5	6.3	4.1	3.2	3.8	2.7	2.3
11.....	4.2	3.7	3.3	2.3	3.1	9.4	6.2	4.1	3.1	3.4	2.7	2.3
12.....	4.2	3.7	3.3	2.4	3.3	8.6	6.1	4.0	3.0	3.2	2.8	2.3
13.....	4.5	3.7	3.3	2.5	3.4	8.6	6.4	3.8	3.0	3.3	2.8	2.3
14.....	4.7	3.7	3.2	2.5	3.3	8.9	6.6	3.9	3.1	3.3	2.8	2.3
15.....	4.7	3.6	3.2	2.5	3.4	8.7	7.0	3.8	3.2	3.3	2.8	2.3
16.....	4.8	3.5	3.2	2.5	3.5	8.5	6.3	3.7	3.2	3.3	2.8	2.3
17.....	4.9	3.5	3.2	2.3	3.7	7.0	6.3	3.7	3.2	3.4	2.6	2.3
18.....	4.7	3.4	3.2	2.3	4.1	6.2	6.1	3.7	3.3	3.3	2.6	2.2
19.....	4.5	3.4	3.2	2.3	4.9	6.1	5.9	3.6	3.3	3.1	2.6	2.3
20.....	4.2	3.3	3.3	2.3	5.5	6.0	6.5	3.6	3.4	3.2	2.5	2.1
21.....	4.2	3.3	3.3	2.4	5.9	6.4	6.4	3.7	3.2	2.9	2.5	2.1
22.....	4.2	3.2	3.3	2.5	5.4	7.8	6.5	3.5	3.3	2.8	2.5	2.1
23.....	4.0	3.1	3.3	2.5	5.3	8.3	6.2	3.5	3.3	2.8	2.4	2.1
24.....	4.1	3.1	3.5	2.5	5.0	8.9	5.9	3.4	3.3	2.8	2.4	1.9
25.....	4.1	3.1	3.8	2.5	4.9	9.4	5.8	3.3	3.3	2.8	2.4	2.0
26.....	4.1	3.1	4.3	2.4	4.8	9.4	5.3	3.2	3.2	2.8	2.4	1.9
27.....	4.1	3.2	4.3	2.3	4.8	9.3	4.9	3.2	3.2	2.9	2.4	2.0
28.....	4.1	3.2	4.2	2.3	4.8	8.9	4.9	3.2	3.1	3.0	2.3	2.0
29.....	4.1	3.2	3.3	2.3	5.0	9.0	4.7	3.2	3.1	3.0	2.4	2.2
30.....	4.1	2.8	2.5	7.0	8.6	4.5	3.2	3.2	3.2	2.3	2.1
31.....	4.1	2.3	6.7	4.5	3.2	3.1	2.1

NOTE.—Ice present at station Jan. 2 to Mar. 29.

Daily discharge, in second-feet, of Yellowstone River at Huntley, Mont., for 1912.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1.....		4,600	4,600	23,800	30,300	13,700	7,050	6,350	6,350	4,000
2.....		4,600	4,950	23,800	33,700	14,200	7,050	6,350	6,350	4,000
3.....		5,300	5,300	25,900	31,400	15,100	7,050	6,350	6,000	3,750
4.....		5,650	5,300	29,200	28,100	14,600	7,050	6,350	6,000	3,750
5.....		4,600	5,300	29,800	26,400	13,200	7,400	6,700	6,000	3,500
6.....		4,600	4,950	30,300	25,900	13,200	7,050	8,100	5,650	3,500
7.....		4,000	4,600	31,400	24,800	11,900	7,050	9,300	5,650	4,000
8.....		3,500	5,300	33,200	24,800	11,400	7,050	9,300	5,300	3,500
9.....		3,500	5,650	35,400	23,200	11,400	7,050	9,700	5,650	4,000
10.....		4,000	6,000	39,000	21,200	10,600	7,050	9,300	5,300	4,000
11.....		4,000	6,700	38,400	20,600	10,600	6,700	7,750	5,300	4,000
12.....		4,300	7,400	33,700	20,100	10,100	6,350	7,050	5,650	4,000
13.....		4,600	7,750	33,700	21,700	9,300	6,350	7,400	5,650	4,000
14.....		4,600	7,400	35,400	22,700	9,700	6,700	7,400	5,650	4,000
15.....		4,600	7,750	34,300	24,800	9,300	7,050	7,400	5,650	4,000
16.....		4,600	8,100	33,200	21,200	8,900	7,050	7,400	5,650	4,000
17.....		4,000	8,900	24,800	21,200	8,900	7,050	7,750	4,950	4,000
18.....		4,000	10,600	20,600	20,100	8,900	7,400	7,400	4,950	3,750
19.....		4,000	14,200	20,100	19,100	8,500	7,400	6,700	4,950	4,000
20.....		4,000	17,100	19,600	22,200	8,500	7,750	7,050	4,600	3,500
21.....		4,300	19,100	21,700	21,700	8,900	7,050	6,000	4,600	3,500
22.....		4,600	16,600	29,200	22,200	8,100	7,400	5,650	4,600	3,500
23.....		4,600	16,100	32,000	20,600	8,100	7,400	5,650	4,300	3,500
24.....		4,600	14,600	35,400	19,100	7,750	7,400	5,650	4,300	3,000
25.....		4,600	14,200	38,400	18,600	7,400	7,400	5,650	4,300	3,250
26.....		4,300	13,700	38,400	16,100	7,050	7,050	5,650	4,300	3,000
27.....		4,000	13,700	37,800	14,200	7,050	7,050	6,000	4,300	3,250
28.....		4,000	13,700	35,400	14,200	7,050	6,700	6,350	4,000	3,250
29.....		4,000	14,600	36,000	13,200	7,050	6,700	6,350	4,300	3,750
30.....	5,650	4,600	24,800	33,700	12,400	7,050	7,050	7,050	4,000	3,500
31.....	4,000		23,200		12,400	7,050		6,700		3,500

NOTE.—Daily discharge determined from a fairly well defined rating curve.

Monthly discharge of Yellowstone River at Huntley, Mont., for 1912.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accu- racy.
	Maximum.	Minimum.	Mean.		
April.....	5,650	3,500	4,360	259,000	B.
May.....	24,800	4,600	10,700	658,000	B.
June.....	39,000	19,600	31,100	1,850,000	B.
July.....	33,700	12,400	21,600	1,330,000	B.
August.....	15,100	7,050	9,820	604,000	B.
September.....	7,750	6,350	7,060	420,000	B.
October.....	9,700	5,650	7,030	432,000	B.
November.....	6,350	4,000	5,140	306,000	B.
December.....	4,000	3,000	3,670	226,000	B.
The period.....				6,080,000	

YELLOWSTONE RIVER AT INTAKE, MONT.

Location.—At the Lower Yellowstone diversion dam at Intake, 18 miles below Glendive, Mont.

Records available.—Records by War Department and Department of Agriculture, 1893 to 1903; August 1, 1903, to December 31, 1912, by United States Geological Survey. Records January 1 to December 31, 1912, from observations at the present station, which replaces the one formerly maintained at Glendive.

Gage.—A chain gage on the north abutment of the dam. The gage readings show the depth of water on the crest of the dam.

Winter flow.—Affected by ice.

The dam.—The dam, a rock-filled timber-crib structure on a pile foundation, was completed January 29, 1910. It is 700 feet long, crosses the stream at right angles to the current, and raises the low-water level of the river about 4 feet. The dam is specially designed to resist the destructive effects of ice by having an approach on a slope of 3 to 1, and the downstream face is ogee-shaped and protected by a heavy rock apron.

Diversions.—The Lower Yellowstone canal, which diverts water to irrigate 66,000 acres of land, has its headworks at the north abutment.

Accuracy.—A curve showing relation of gage heights at Glendive and at Lower Yellowstone dam was constructed. Using this curve of relation and discharge measurements made at Glendive, a discharge curve was constructed which is applicable to the gage heights of Lower Yellowstone dam, and should give fair results.

Daily gage height, in feet, of Yellowstone River at Intake, Mont., for 1912.

[F. F. Horsford, observer.]

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1.....		6.5	2.4	4.4	6.6	3.6	2.6	2.8	2.7	2.0
2.....		7.1	2.3	5.2	7.4	3.5	2.6	2.8	2.6	1.8
3.....		6.4	2.3	5.4	8.7	3.5	2.6	2.7	2.5	1.6
4.....		5.8	2.6	5.4	10.1	3.9	2.6	2.7	2.4	1.6
5.....		5.8	4.0	5.7	9.8	4.7	2.6	2.8	2.4	1.5
6.....		5.6	3.8	6.4	8.6	5.2	2.6	3.4	2.3	1.4
7.....		5.2	5.0	6.5	7.2	5.0	2.7	3.6	2.4	2.2
8.....		4.2	5.0	6.6	6.4	4.4	2.8	3.6	2.5	1.6
9.....		3.8	4.4	6.8	6.7	4.2	2.7	3.6	2.4	1.6
10.....		3.3	3.6	6.9	6.0	4.0	2.6	3.6	2.4	1.5
11.....		3.0	3.0	7.4	5.6	3.8	2.6	3.4	2.4	1.5
12.....		3.0	2.7	7.9	5.2	3.6	2.6	3.4	2.4	1.4
13.....		3.0	2.7	8.2	5.2	3.5	2.6	3.2	2.4	1.6
14.....		3.4	2.8	7.8	5.0	3.4	2.7	3.1	2.4	1.5
15.....		3.2	3.0	7.6	4.8	3.3	3.2	3.0	2.4	1.5
16.....		3.2	3.0	8.0	4.8	3.2	3.0	3.0	2.3	1.5
17.....		3.4	2.9	7.6	5.0	3.2	3.1	2.9	2.2	1.5
18.....		3.6	2.8	6.8	4.8	3.4	3.3	2.8	2.2	1.6
19.....		2.9	2.8	6.3	4.7	4.1	3.2	2.6	2.2	1.5
20.....		3.0	2.9	5.7	4.5	4.4	3.2	2.5	2.2	1.5
21.....		2.8	3.8	5.4	4.6	4.6	3.0	2.4	2.2	1.4
22.....		2.6	4.3	5.2	4.6	4.0	3.1	2.4	2.1	1.2
23.....		2.8	4.8	5.4	5.2	3.6	3.1	2.4	2.0	1.1
24.....		2.8	5.4	5.8	5.1	3.4	3.1	2.4	2.0	1.0
25.....		2.6	5.0	6.0	5.0	3.2	3.0	2.3	2.0	1.0
26.....		2.4	4.5	6.2	4.8	3.0	3.0	2.3	2.0	.9
27.....	2.8	2.4	4.2	6.5	4.4	2.8	3.0	2.3	2.0	.9
28.....	8.3	2.4	4.3	6.6	4.2	2.8	2.9	2.4	2.0	.9
29.....	10.2	2.5	4.4	6.6	4.0	2.7	2.9	3.0	2.2	1.0
30.....	7.5	2.4	4.6	6.7	4.0	2.6	2.9	2.8	2.1	1.0
31.....	6.8		4.4		3.8	2.6		2.8		1.0

NOTE.—Gage heights after Oct. 18 are somewhat doubtful, owing to the fact that on April 21, 1914, the gage was found to be reading 0.7 foot low. Hydrographs indicate that gage was reading correctly up to Oct. 18, 1912, and that after that time it was probably in error. No correction has been made of observations in 1912.

Daily discharge, in second-feet, of Yellowstone River at Intake, Mont., for 1912.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1.....		55,200	10,200	27,500	56,800	19,500	11,500	12,900	12,200	7,800
2.....		64,400	9,540	36,800	69,100	18,600	11,500	12,900	11,500	6,740
3.....		53,800	9,540	39,400	89,600	18,600	11,500	12,200	10,800	5,760
4.....		45,000	11,500	39,400	112,000	22,400	11,500	12,200	10,200	5,760
5.....		45,000	23,400	43,600	107,000	30,800	11,500	12,900	10,200	5,300
6.....		42,200	21,400	53,800	88,000	36,800	11,500	17,700	9,540	4,860
7.....		36,800	34,300	55,200	66,000	34,300	12,200	19,500	10,200	8,940
8.....		25,400	34,300	56,800	53,800	27,500	12,900	19,500	10,800	5,760
9.....		21,400	27,500	59,800	58,200	25,400	12,200	19,500	10,200	5,760
10.....		16,800	19,500	61,400	47,900	23,400	11,500	19,500	10,200	5,300
11.....		14,400	14,400	69,100	42,200	21,400	11,500	17,700	10,200	5,300
12.....		14,400	12,200	76,800	36,800	19,500	11,500	17,700	10,200	4,860
13.....		14,400	12,200	81,600	36,800	18,600	11,500	16,000	10,200	5,760
14.....		17,700	12,900	75,300	34,300	17,700	12,200	15,200	10,200	5,300
15.....		16,000	14,400	72,200	32,000	16,800	16,000	14,400	10,200	5,300
16.....		16,000	14,400	78,400	32,000	16,000	14,400	14,400	9,540	5,300
17.....		17,700	13,600	72,200	34,300	16,000	15,200	13,600	8,940	5,300
18.....		19,500	12,900	59,800	32,000	17,700	16,800	12,900	8,940	5,760
19.....		13,600	12,900	52,200	30,800	24,400	16,000	11,500	8,940	5,300
20.....		14,400	13,600	43,600	28,600	27,500	16,000	10,800	8,940	5,300
21.....		12,900	21,400	39,400	29,600	29,600	14,400	10,200	8,940	4,860
22.....		11,500	26,400	36,800	29,600	23,400	15,200	10,200	8,360	4,040
23.....		12,900	32,000	39,400	36,800	19,500	15,200	10,200	7,800	3,660
24.....		12,900	39,400	45,000	35,600	17,700	15,200	10,200	7,800	3,300
25.....		11,500	34,300	47,900	34,300	16,000	14,400	9,540	7,800	3,300
26.....		10,200	28,600	50,800	32,000	14,400	14,400	9,540	7,800	2,950
27.....	12,900	10,200	25,400	55,200	27,500	12,900	14,400	9,540	7,800	2,950
28.....	83,200	10,200	26,400	56,800	25,400	12,900	13,600	10,200	7,800	2,950
29.....	114,000	10,800	27,500	56,800	23,400	12,900	13,600	14,400	8,940	3,300
30.....	70,600	10,200	29,600	58,200	23,400	11,500	13,600	12,900	8,360	3,300
31.....	59,800		27,500		21,400	11,500		12,900		3,300

NOTE.—Daily discharge determined from a poorly defined rating curve. See station description for method of rating.

Monthly discharge of Yellowstone River at Intake, Mont., for 1912.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accu- racy.
	Maximum.	Minimum.	Mean.		
March 27-31.....	114,000	12,900	68,100	675,000	C.
April.....	64,400	10,200	22,600	1,340,000	C.
May.....	39,400	9,540	21,100	1,300,000	C.
June.....	81,600	27,500	54,700	3,250,000	C.
July.....	112,000	21,400	45,400	2,790,000	C.
August.....	36,800	11,500	20,500	1,260,000	C.
September.....	16,800	11,500	13,400	797,000	C.
October.....	19,500	9,540	13,600	836,000	D.
November.....	12,200	7,800	9,450	562,000	D.
December.....	8,940	2,950	4,950	304,000	D.
The period.....				13,100,000	

BIG TIMBER CREEK NEAR BIG TIMBER, MONT.

Location.—At Webb's ranch, about 9 miles northwest of Big Timber.

Records available.—April 13, 1912, to December 31, 1912. Stations were maintained on the North and South Forks of Big Timber Creek May 6, 1907, to December 31, 1911.

Drainage area.—Not measured.

Gage.—Chain gage on left bank.

Channel.—Shifts during high water.

Discharge measurements.—Made by wading at all stages. Above the gage are several channels which may be measured separately at high stages.

Winter flow.—Affected by ice.

Diversions.—Much water is diverted for irrigation above the station.

Accuracy.—Conditions for obtaining accurate discharge data are good.

Discharge measurements of Big Timber Creek near Big Timber, Mont., in 1912.

Date.	Hydrographer.	Gage height.	Dis-charge.
		<i>Feet.</i>	<i>Sec.-ft.</i>
Apr. 13	C. S. Heidel	2.00	37
19	do.	1.92	30
June 13	do.	3.20	337
Aug. 15	do.	2.01	38

Daily gage height, in feet, of Big Timber Creek near Big Timber, Mont., for 1912.

[L. E. Webb, observer.]

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1.		2.0	2.6	2.7	2.3	1.9	1.8	2.0	1.8
2.		2.0	2.9	2.7	2.2	2.0	1.9	1.8	1.8
3.		2.0	2.8	2.7	2.2	2.0	1.8	1.8	1.8
4.		2.0	2.8	2.5	2.2	2.0	1.9	1.8	1.8
5.		2.0	2.7	2.5	2.2		1.9	1.8	1.8
6.		2.1	2.7	2.6	2.1		1.8	1.9	1.8
7.		2.0	2.6	2.6	2.1	1.9	2.0	2.0	1.9
8.		2.1	3.0	2.5	2.1	1.9	1.8	2.0	
9.		2.1	3.3	2.6	2.1	1.9	1.8	2.0	
10.		2.2	3.1	2.5	2.1	1.9	1.8	2.0	
11.		2.1	2.9	2.5	2.1	1.9	1.8	2.0	
12.		2.0	3.3	2.5	2.1	1.9	1.8	2.0	
13.	2.0	2.1	2.9	2.4	2.1	1.9	1.8	2.0	
14.	2.1	2.1	3.0	2.6	2.1	2.0	1.8	2.0	
15.	1.9	2.2	3.2	2.8	2.2	1.8	1.7	2.0	
16.	2.0	2.3	2.5	2.7	2.1	1.9	1.7	1.9	
17.	2.0	2.4	2.5	2.5	2.0	1.9	1.7	1.9	
18.	1.9	2.5	2.4	2.5	2.0	1.8	1.7	1.9	
19.	2.0	2.6	2.5	2.6	2.0	1.8	1.7	1.9	
20.	2.0	3.1	2.7	2.3	1.9	1.8	1.8	1.9	
21.	1.9	2.8	2.9	2.3	2.0	1.8	1.9	1.9	
22.	1.9	2.6	3.1	2.3	1.9	1.8	1.9	1.9	
23.	1.9	2.5	3.1	2.2	1.9	1.8	1.9	1.9	
24.	2.0	2.4	3.1	2.3	1.9	1.8	1.9	1.9	
25.	2.0	2.4	3.1	2.3	1.9	1.8	1.9	1.9	
26.	2.1	2.6	3.1	2.2	1.9	1.8	1.9	1.9	
27.	2.0	2.7	3.1	2.2	1.9	1.8	1.9	1.8	
28.		2.5	3.0	2.2	2.0	1.8	1.9	1.8	
29.	2.0	2.6	3.0	2.2	2.1	1.8	1.9	1.8	
30.	2.0	2.9	2.8	2.2	2.0	1.8	1.8	1.8	
31.		2.7		2.3	2.0		1.8		

Daily discharge, in second-feet, of Big Timber Creek near Big Timber, Mont., for 1912.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1.		38	142	170	78	28	21	38	21
2.		38	232	170	62	38	28	21	21
3.		38	200	170	62	38	21	21	21
4.		38	200	118	62	38	28	21	21
5.		38	170	118	62	35	28	21	21
6.		49	170	142	49	31	21	28	21
7.		38	142	142	49	28	38	38	28
8.		49	266	118	49	28	21	38	
9.		49	380	142	49	28	21	38	
10.		62	302	118	49	28	21	38	

Daily discharge, in second-feet, of Big Timber Creek near Big Timber, Mont., for 1912—Continued.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
11.....		49	232	118	49	28	21	38
12.....		38	380	118	49	28	21	38
13.....	38	49	232	96	49	28	21	38
14.....	49	266	142	49	38	21	38
15.....	28	62	340	200	62	21	16	38
16.....	38	78	118	170	49	28	16	28
17.....	38	96	118	118	38	28	16	28
18.....	28	118	96	118	38	21	16	28
19.....	38	142	118	142	38	21	16	28
20.....	38	302	170	78	28	21	21	28
21.....	28	200	232	78	38	21	28	28
22.....	28	142	302	78	28	21	28	28
23.....	28	118	302	62	28	21	28	28
24.....	38	96	302	78	28	21	28	28
25.....	38	96	302	78	28	21	28	28
26.....	49	142	302	62	28	21	28	28
27.....	38	170	302	62	28	21	28	21
28.....	38	118	266	62	38	21	28	21
29.....	38	142	266	62	49	21	28	21
30.....	38	232	200	62	38	21	21	21
31.....		170			38		21	

NOTE.—Daily discharge determined from a well-defined rating curve. Discharge interpolated for days for which gage heights are missing.

Monthly discharge of Big Timber Creek near Big Timber, Mont., for 1912.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accu- racy.
	Maximum.	Minimum.	Mean.		
Apr. 13-30.....	49	28	36.4	1,300	A.
May.....	302	38	98.3	6,040	A.
June.....	380	96	235	14,000	A.
July.....	200	62	112	6,890	A.
August.....	78	28	44.8	2,750	A.
September.....	38	21	26.4	1,570	A.
October.....	38	16	23.5	1,440	A.
November.....	38	21	29.5	1,760	A.
December 1-7.....	28	21	22.0	305	A.
The period.....				36,100	

BOULDER RIVER NEAR CONTACT, MONT.

Location.—In the SE. $\frac{1}{4}$ sec. 14, T. 3 S., R. 12 E., at the ranch of G. W. Baker, about 8 miles above McLeod post office, 4 miles from Contact, Mont., and $2\frac{1}{2}$ miles below the Boulder Falls.

Records available.—May 1, 1910, to December 31, 1912.

Drainage area.—Not measured.

Gage.—Staff, fastened to left abutment of private wagon bridge near the ranch buildings.

Channel.—Rocky; permanent.

Discharge measurements.—Made from the bridge or by wading just above the footbridge, which is some 400 yards above the gage.

Winter flow.—Affected by ice.

Accuracy.—Good.

Discharge measurements of Boulder River near Contact, Mont., in 1912.

Date.	Hydrographer.	Gage height.	Discharge.
		<i>Feet.</i>	<i>Sec.-ft.</i>
Jan. 18	J. C. Beebe	a 2.25	56
Apr. 16	C. S. Heidel	2.38	72
June 11	do	5.92	2,410
Aug. 16	do	3.29	400

a Ice present.

Daily gage height, in feet, of Boulder River near Contact, Mont., for 1912.

[G. W. Baker, observer.]

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
1		2.4	2.65	4.5	6.2	3.65	2.9	2.9
2		2.4	2.75	4.4	6.1	3.7	2.9	2.9
3		2.5	2.75	5.0	5.6	3.95	2.85	3.0
4		2.5	2.75	4.8	6.4	3.9	2.85	3.0
5		2.55	2.75	4.7	6.2	3.8	2.85	3.0
6		2.55	2.75	5.2	5.9	3.7	2.8	2.9
7		2.55	2.75	5.6	5.9	3.6	2.8	2.9
8		2.58	2.75	5.6	5.2	3.6	2.8	2.85
9		2.58	2.75	6.1	4.7	3.5	2.75	2.85
10		2.58	3.05	6.2	4.6	3.45	2.75	2.85
11		2.58	3.15	5.8	4.7	3.4	2.75	2.85
12		2.62	3.25	6.1	5.0	3.4	2.75	2.8
13		2.62	3.25	5.7	6.2	3.35	2.7	2.8
14		2.62	3.35	5.4	5.1	3.3	2.7	2.8
15		2.65	3.35	5.4	4.9	3.3	2.7	2.75
16		2.65	3.45	4.9	4.7	3.3	2.75	2.75
17		2.65	3.45	4.8	4.7	3.3	2.75	2.75
18		2.65	3.6	4.4	4.5	3.65	2.75	2.75
19		2.65	3.9	5.5	4.6	3.65	2.8	2.75
20		2.65	4.3	5.6	4.6	3.5	2.8	2.75
21		2.68	4.5	6.4	4.9	3.35	2.8	2.7
22		2.68	4.5	7.0	4.8	3.3	2.8	2.7
23		2.65	3.8	7.1	4.7	3.2	2.8	2.7
24	2.35	2.65	3.8	7.2	4.4	3.15	2.85	2.7
25	2.35	2.65	3.65	7.4	4.1	3.1	2.85	2.75
26	2.35	2.65	3.8	7.2	3.95	3.1	2.85	2.75
27	2.35	2.65	4.1	7.2	3.9	3.0	2.85	2.75
28	2.35	2.65	4.2	7.2	3.85	3.0	2.8	2.7
29	2.35	2.69	4.4	6.9	3.75	3.0	2.8	2.7
30	2.35	2.69	4.6	6.5	3.75	2.9	2.8	2.7
31	2.35		4.5		3.65	2.9		2.7

Daily discharge, in second-feet, of Boulder River near Contact, Mont., for 1912.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
1		90	155	1,200	2,680	600	240	240
2		90	185	1,120	2,590	630	240	240
3		115	185	1,600	2,140	795	220	280
4		115	185	1,440	2,860	760	220	280
5		128	185	1,360	2,680	690	220	280
6		128	185	1,780	2,410	630	200	240
7		128	185	2,140	2,410	570	200	240
8		135	185	2,140	1,780	570	200	220
9		135	185	2,590	1,360	510	185	220
10		135	300	2,680	1,280	485	185	220
11		135	340	2,320	1,360	460	185	220
12		146	385	2,590	1,600	460	185	200
13		146	385	2,230	2,680	435	170	200
14		146	435	1,960	1,690	410	170	200
15		155	435	1,960	1,520	410	170	185

Daily discharge, in second-feet, of Boulder River near Contact, Mont., for 1912—Contd.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
16.....		155	485	1,520	1,360	410	185	185
17.....		155	485	1,440	1,360	410	185	185
18.....		155	570	1,120	1,200	600	185	185
19.....		155	760	2,050	1,280	600	200	185
20.....		155	1,040	2,140	1,280	510	200	185
21.....		164	1,200	2,860	1,520	435	200	170
22.....		164	1,200	3,400	1,440	410	200	170
23.....		155	690	3,490	1,360	360	200	170
24.....	78	155	690	3,580	1,120	340	220	170
25.....	78	155	600	3,760	900	320	220	185
26.....	78	155	690	3,580	795	320	220	185
27.....	78	155	900	3,580	760	280	220	185
28.....	78	155	970	3,580	725	280	200	170
29.....	78	167	1,120	3,310	660	280	200	170
30.....	78	167	1,280	2,950	660	240	200	170
31.....	78		1,200		600	240		170

NOTE.—Daily discharge determined from a well-defined rating curve.

Monthly discharge of Boulder River near Contact, Mont., for 1912.

[Drainage area, 234 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
March 24-31.....	78	78	78.0	0.333	0.10	1,240	B.
April.....	167	90	143	.611	.68	8,510	A.
May.....	1,280	155	574	2.45	2.82	35,300	A.
June.....	3,760	1,120	2,390	10.2	11.38	142,000	A.
July.....	2,860	600	1,550	6.62	7.63	95,300	A.
August.....	795	240	466	1.99	2.29	28,700	A.
September.....	240	170	201	.859	.96	12,000	A.
October.....	280	170	203	.868	1.00	12,500	A.
The period.....						336,000	

BOULDER RIVER NEAR McLEOD, MONT.

Location.—On the bridge at Loasby's ranch, 17 miles southwest of Big Timber and half a mile below McLeod.

Records available.—April 17, 1912, to December 31, 1912. Previous records were obtained on Boulder River near Contact, and on East Boulder and West Boulder.

Drainage area.—Not measured.

Gage.—Staff spiked to lower side of middle pier of bridge.

Channel.—Probably permanent.

Discharge measurements.—Made from the bridge at the gage.

Winter flow.—Affected by ice.

Diversions.—Water is diverted from the principal tributaries for irrigation.

Accuracy.—Conditions for obtaining accurate discharge data are good.

Discharge measurements of Boulder River near McLeod, Mont., in 1912.

Date.	Hydrographer.	Gage height.	Discharge.
Apr. 17	C. S. Heidel.....	Feet.	Sec.-ft.
June 11do.....	3.58	176
Aug. 16do.....	7.30	3,280
		4.75	697

Daily gage height, in feet, and discharge, in second-feet, of Boulder River near McLeod, Mont., for 1912.

[C. E. Curtis, observer.]

Day.	April.		May.		June.		July.	
	Gage height.	Dis-charge.	Gage height.	Dis-charge.	Gage height.	Dis-charge.	Gage height.	Dis-charge.
1			3.75	240	5.6	1,300		
2			3.77	248	6.0	1,660		
3			3.70	220	6.5	2,210		
4			3.7	220	6.8	2,590		
5			3.7	220	6.5	2,210		
6			3.7	220	6.6	2,330		
7			3.8	260	7.0	2,850	6.5	2,210
8			3.9	300	7.5	3,600	6.5	2,210
9			3.95	320	7.8	4,080	6.5	2,210
10			4.3	470	8.0	4,400	6.4	2,090
11			4.4	520	7.1	2,990	6.4	2,090
12			4.4	520	7.5	3,600	6.2	1,860
13			4.5	570	7.5	3,600	6.2	1,860
14			4.5	570	7.0	2,850	6.1	1,760
15			4.6	620	6.2	1,860	6.0	1,660
16			4.65	645	6.4	2,090	6.1	1,760
17	3.58	184	5.0	850	4.7	670	6.2	1,860
18	3.55	175	5.6	1,300	4.8	730	6.3	1,970
19	3.55	175	5.8	1,480	5.5	1,220	6.3	1,970
20	3.5	160	5.8	1,480	6.1	1,760	6.1	1,760
21	3.4	130	5.7	1,390	7.0	2,850		
22	3.5	160	5.6	1,300	7.4	3,440		
23	3.7	220	5.4	1,140	8.0	4,400		
24	3.75	240	5.25	1,020	8.6	5,400		
25	3.75	240	5.2	990	8.5	5,230		
26	3.70	220	5.2	990	8.5	5,230		
27	3.74	236	5.4	1,140	8.5	5,230		
28	3.75	240	5.5	1,220	8.2	4,720		
29	3.75	240	5.5	1,220	8.2	4,720		
30	3.78	252	5.5	1,220	6.9	2,720		
31			5.5	1,220				

NOTE.—Daily discharge determined from a fairly well defined rating curve.

Monthly discharge of Boulder River near McLeod, Mont., for 1912.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accu- racy.
	Maximum.	Minimum.	Mean.		
April 17-30	252	130	205	5,690	B.
May	1,480	220	778	47,800	B.
June	5,400	670	3,080	183,000	B.
July 7-20	2,210	1,660	1,950	54,200	B.

WEST FORK OF BOULDER RIVER AT MCLEOD, MONT.

Location.—In the SE. $\frac{1}{4}$ sec. 16, T. 2 S., R. 13 E., at Koozer's private bridge, 200 yards upstream from the highway bridge at McLeod post office.

Records available.—May 4, 1907, to December 31, 1912.

Drainage area.—137 square miles.

Gage.—Staff, fastened to piling of bridge near right bank; datum unchanged.

Channel.—Composed of bowlders; rough but permanent.

Discharge measurements.—Made from bridge or by wading.

Winter flow.—Affected by ice.

Diversions.—Water to irrigate about 800 acres of land is diverted above the station.

A Carey Act project reclaiming 12,000 to 15,000 acres is now under investigation;

the water is to be diverted from the West Fork about 12 miles above the station.

Accuracy.—Open-water records good.

Discharge measurements of West Fork of Boulder River at McLeod, Mont., in 1912.

Date.	Hydrographer.	Gage height.	Dis-charge.
		<i>Feet.</i> (a)	<i>Sec.-ft.</i>
Jan. 18	J. C. Beebe.....	1.48	28
Apr. 16	C. S. Heidel.....	3.70	45
June 10do.....	3.70	1,060
Aug. 16do.....	2.05	152

^a Ice prevented reading of the gage.

Daily gage height, in feet, and discharge, in second-feet, of West Fork of Boulder River at McLeod, Mont., for 1912.

[M. C. Curtis, observer.]

Day.	April.		May.		June.		July.		August.	
	Gage height.	Dis-charge.	Gage height.	Dis-charge.	Gage height.	Dis-charge.	Gage height.	Dis-charge.	Gage height.	Dis-charge.
1.....			1.65	70	.4	*				
2.....			1.62	65	3.0	595				
3.....			1.60	62	3.5	920				
4.....			1.6	62	3.7	1,060			2.4	280
5.....			1.6	62	3.5	920			2.5	325
6.....			1.6	62	3.5	920			2.7	430
7.....			1.8	98	4.0	1,270	3.1	655	2.3	240
8.....			1.8	98	4.1	1,340	3.1	655	2.2	204
9.....			1.9	122	4.3	1,500	3.05	625	2.1	174
10.....			2.0	148	4.0	1,270	3.2	720	2.1	174
11.....			2.25	222	3.5	920	3.3	785	2.4	280
12.....			2.2	204	3.5	920	3.3	785	2.5	325
13.....			2.0	148	4.1	1,340	3.4	850	2.5	325
14.....			2.2	204	3.5	920	3.4	850	2.3	240
15.....			2.4	280	3.3	785	3.3	785	2.2	204
16.....	1.48	48	2.4	280	3.4	850	3.3	785	2.2	204
17.....	1.05	22	2.55	350	3.5	920	3.3	785	2.2	204
18.....	1.48	48	2.75	458	3.7	1,060	3.2	720		
19.....	1.55	56	2.8	485	3.7	1,060	3.2	720		
20.....	1.25	29	2.75	458	3.7	1,060	3.1	655		
21.....	1.50	50	2.75	458	3.5	920				
22.....	1.55	56	2.5	325	3.5	920				
23.....	1.6	62	2.4	280	3.9	1,200				
24.....	1.65	70	2.2	204	4.0	1,270				
25.....	1.62	65	2.1	174	4.2	1,420				
26.....	1.60	62	2.1	174	4.1	1,340				
27.....	1.6	62	2.1	174	4.0	1,270				
28.....	1.6	62	2.2	204	4.0	1,270				
29.....	1.6	62	2.4	280	3.8	1,130				
30.....	1.65	70	2.5	325	3.6	990				
31.....			2.5	325						

NOTE.—Daily discharge determined from a rating curve well defined for discharge above 60 second-feet and fairly well defined at lower stages.

Monthly discharge of West Fork of Boulder River at McLeod, Mont., for 1912.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accu- racy.
	Maximum.	Minimum.	Mean.		
April 16-30.....	70	22	54.9	1,630	B.
May.....	485	62	221	13,600	A.
June.....	1,500	280	1,050	62,500	A.
July 7-20.....	850	625	741	20,600	A.
August 4-17.....	430	174	258	7,160	A.
The period.....				105,000	

SWEETGRASS CREEK ABOVE MELVILLE, MONT.

Location.—In the SW. $\frac{1}{4}$ sec. 24, T. 5 N., R. 12 E., at C. M. Rein's ranch, 17 miles northwest of Melville and 35 miles from Big Timber, at the site of a reservoir proposed under the Carey Act.

Records available.—May 5, 1907, to December 31, 1912.

Drainage area.—69 square miles.

Gage.—A staff nailed to lower side (right bank) of a footbridge directly behind the ranch buildings. When the station was established a secondary staff gage, to be used during extreme high water, was installed about 300 feet below the regular gage and at a different datum. The regular gage was undermined during the high water of June and July, 1908, and readings were discontinued August 19 of that year. The present gage, which is the old secondary gage, has been read since October 1, 1908. The gage heights on the new gage are not comparable with those read on the old gage.

Channel.—Composed of rough gravel.

Discharge measurements.—Made by wading near gage at ordinary stages; at high stages made from footbridge.

Winter flow.—Stream freezes over during winter months.

Diversions.—Two small ditches divert water above the station.

Discharge measurements of Sweetgrass Creek above Melville, Mont., in 1912.

Date.	Hydrographer.	Gage height.	Dis- charge.
		<i>Feet.</i>	<i>Sec.-ft.</i>
Apr. 19	C. S. Heidel.....	1.48	13.4
June 12do.....	2.92	483
Aug. 14do.....	1.91	72

Daily gage height, in feet, and discharge, in second-feet, of Sweetgrass Creek above Melville, Mont., for 1912.

[C. M. Rein, observer.]

Day.	April.		May.		June.		July.		August.		September.	
	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
1.....				10	2.6	314	2.6	314	2.1	127	1.95	86
2.....				11	2.75	388	2.6	314	2.1	127	1.95	86
3.....			1.48	12	2.9	470	2.6	314	2.15	142	1.95	86
4.....			1.48	12	2.55	292	2.6	314	2.18	152	1.95	86
5.....				12	2.7	362	2.4	229	2.15	142	1.95	86
6.....			1.48	12	2.8	415	2.45	250	2.0	98	1.95	86
7.....			1.48	12	2.8	415	2.48	262	2.0	98	1.95	86
8.....			1.48	12	2.95	500	2.55	292	2.0	98	1.95	86
9.....			1.48	12	3.05	562	2.35	210	2.0	98	1.95	86
10.....				12	3.2	665	2.3	192	2.05	112	1.95	86
11.....			1.50	13	3.05	562	2.35	210	2.05	112	1.95	86
12.....				17	3.0	530	2.45	250	2.05	112	1.95	86
13.....				20	3.4	820	2.42	237	2.05	112	1.95	86
14.....				24	3.05	562	2.42	237	1.9	73	1.95	86
15.....				27	2.55	292	2.30	192	1.9	73	1.95	86
16.....				31	2.5	270	2.32	199	1.9	73	1.95	86
17.....				34	2.42	237	2.3	192	1.9	73	1.94	83
18.....			1.72	38	2.38	222	2.25	175	1.9	73	1.90	73
19.....	1.48	12	1.95	86	2.55	292	2.35	210	1.9	73	1.85	62
20.....	1.48	12	2.7	362	2.7	362	2.28	185	1.9	73	1.8	52
21.....	1.44	9.7	2.7	362	3.05	562	2.32	199	1.9	73	1.85	62
22.....		9.2	2.50	270	3.2	665	2.32	199	1.9	73	1.85	62
23.....	1.42	8.6	2.32	199	3.1	595	2.30	192	1.95	86	1.85	62
24.....		8.6	2.32	199	3.15	630	2.22	165	1.95	86	1.85	62
25.....	1.42	8.6	2.30	192	3.2	665	2.25	175	1.95	86	1.85	62
26.....	1.42	8.6	2.5	270	3.2	665	2.25	175	1.95	86	1.85	62
27.....	1.42	8.6	2.60	314	3.05	562	2.18	152	1.95	86	1.85	62
28.....	1.42	8.6	2.48	262	2.9	470	2.10	127	1.95	86	1.85	62
29.....	1.42	8.6	2.45	250	2.8	415	2.1	127	1.90	52	1.85	62
30.....	1.42	8.6	2.8	415	2.6	314	2.1	127	1.52	56	1.85	62
31.....			2.75	388			2.1	127	1.95	86		

NOTE.—Daily discharge determined from a fairly well-defined rating curve. Discharge interpolated for days for which gage heights are missing.

Monthly discharge of Sweetgrass Creek above Melville, Mont., for 1912.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accu- racy.
	Maximum.	Minimum.	Mean.		
April 19-30.....	12	8.6	9.31	222	B.
May.....	415	10	125	7,690	B.
June.....	820	222	469	27,900	B.
July.....	314	127	211	13,000	B.
August.....	152	52	93.5	5,750	B.
September.....	86	52	75.5	4,490	B.
The period.....				59,100	

SWEETGRASS CREEK BELOW MELVILLE, MONT.

Location.—At McAllister's ranch, just above the head of the canal owned by the Glass-Lindsay Land Co.

Records available.—May 4, 1907 (at Adam's ranch site), to April 1, 1909; new site April 1, 1909, to December 31, 1912.

Gage.—Staff on left bank near observer's house; the original gage was located $2\frac{1}{2}$ miles below the headgate of the Glass-Lindsay Land Co.'s canal, 9 miles below Melville and 20 miles from Big Timber. The present gage was installed April 1, 1909, when the old station was discontinued.

Channel.—Bed composed of clean gravel; nonshifting.

Discharge measurements.—Made by wading.

Winter flow.—Affected by ice.

Diversions and storage.—Many diversions are made from this stream. All the low-water flow is appropriated, 550 second-feet being held by adjudicated rights. The Glass-Lindsay canal will carry 575 second-feet and irrigate 30,000 acres; the canal will divert water into two storage reservoirs with capacities of 12,000 and 6,000 feet, respectively, which will be filled from the spring run-off.

Accuracy.—Records good.

Discharge measurements of Sweetgrass Creek below Melville, Mont., in 1912.

Date.	Hydrographer.	Gage height.	Dis-charge.
		<i>Feet.</i>	<i>Sec.-ft.</i>
Apr. 18	C. S. Heidel.....	1.07	39
June 12do.....	2.15	366
Aug. 14do.....	.91	26

Daily gage height, in feet, of Sweetgrass Creek below Melville, Mont., for 1912.

[Gus Wright, observer.]

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1.....		0.95	1.95	1.85	1.1	1.0	1.1	1.2
2.....		.95	1.95	1.9	1.1	1.0	1.1	1.2
3.....		1.05	1.95	2.0	1.1	1.0	1.1	1.2
4.....		1.05	1.88	2.0	1.1	1.0	1.1	1.2
5.....		1.1	1.85	2.0	1.1	1.0	1.1	1.2
6.....		1.15	1.98	2.0	1.0	1.0	1.1	1.2
7.....		1.08	2.05	1.75	1.0	1.0	1.2	1.2
8.....		1.05	2.05	1.68	1.0	1.0	1.2	1.3
9.....	1.0	1.05	2.05	1.60	1.0	1.0	1.2	1.3
10.....	1.05	1.05	2.3	1.6	1.0	1.0	1.2	1.4
11.....	1.08	1.05	2.45	1.6	1.0	1.0	1.2	1.4
12.....	1.08	1.05	2.3	1.6	.9	1.0	1.2	1.4
13.....	1.10	1.05	2.2	1.6	.9	1.0	1.2	1.4
14.....	1.22	1.05	1.95	1.6	.9	1.1	1.2	1.3
15.....	1.15	1.0	1.8	1.6	.9	1.1	1.2	1.3
16.....	1.05	.9	1.8	1.60	.9	1.1	1.2	1.3
17.....	1.08	.9	1.8	1.72	.9	1.1	1.2	1.3
18.....	1.00	.9	1.8	1.62	1.0	1.1	1.2	1.3
19.....	1.0	.90	1.95	1.60	1.0	1.1	1.2	1.3
20.....	1.0	1.48	2.1	1.6	1.0	1.1	1.1	1.3
21.....	1.0	2.40	2.2	1.60	1.0	1.1	1.1	1.2
22.....	.92	2.3	2.25	1.48	1.0	1.1	1.1	1.2
23.....	.90	1.85	2.3	1.30	1.0	1.1	1.1	1.2
24.....	.9	1.78	2.2	1.3	1.0	1.1	1.1	1.2
25.....	.9	1.70	2.2	1.3	1.0	1.1	1.1
26.....	.9	1.70	2.2	1.3	1.0	1.1	1.1
27.....	.9	1.72	1.9	1.3	1.0	1.1	1.1
28.....	.95	1.72	1.6	1.2	1.0	1.1	1.1
29.....	.95	1.82	1.6	1.2	1.0	1.1	1.2
30.....	.95	1.95	1.85	1.10	1.0	1.1	1.2
31.....		1.95	1.08	1.0	1.2

Daily discharge, in second-feet, of Sweetgrass Creek below Melville, Mont., for 1912.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1.....		30	268	226	45	34	45	59
2.....		30	268	245	45	34	45	59
3.....		40	268	290	45	34	45	59
4.....		40	237	290	45	34	45	59
5.....		45	226	290	45	34	45	59
6.....		52	281	290	34	24	45	59
7.....		43	315	190	34	34	59	59
8.....		40	315	168	34	34	59	75
9.....	34	40	315	145	34	34	59	75
10.....	40	40	445	145	34	34	59	95
11.....	43	40	538	145	34	34	59	95
12.....	43	40	445	145	25	34	59	95
13.....	45	40	390	145	25	34	59	95
14.....	62	40	268	145	25	45	59	75
15.....	52	34	206	145	25	45	59	75
16.....	40	25	206	145	25	45	59	75
17.....	43	25	206	180	25	45	59	75
18.....	34	25	206	151	34	45	59	75
19.....	34	25	268	145	34	45	59	75
20.....	34	113	340	145	34	45	45	75
21.....	34	505	390	145	34	45	45	59
22.....	27	445	418	113	34	45	45	59
23.....	25	226	445	75	34	45	45	59
24.....	25	200	390	75	34	45	45	59
25.....	25	174	390	75	34	45	45	-----
26.....	25	174	390	75	34	45	45	-----
27.....	25	180	245	75	34	45	45	-----
28.....	30	180	145	59	34	45	45	-----
29.....	30	214	145	59	34	45	59	-----
30.....	30	268	226	45	34	45	59	-----
31.....		268	-----	43	34	-----	59	-----

NOTE.—Daily discharge determined from a fairly well-defined rating curve.

Monthly discharge of Sweetgrass Creek below Melville, Mont., for 1912.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accu- racy.
	Maximum.	Minimum.	Mean.		
April 9-30.....	62	25	35.5	1,550	B.
May.....	505	25	117	7,190	B.
June.....	538	145	306	18,200	B.
July.....	290	43	149	9,160	B.
August.....	45	25	34.0	2,090	B.
September.....	45	34	40.2	2,390	B.
October.....	59	45	52.2	3,210	B.
November 1-24.....	95	59	71.0	3,380	B.
The period.....	-----	-----	-----	47,200	

STILLWATER RIVER NEAR NYE, MONT.

Location.—In W. $\frac{1}{2}$ SW. $\frac{1}{4}$ sec. 28, T. 5 S., R. 15 E., directly back of B. F. Wood's ranch, 1 mile below Woodbine Creek, and 7 miles from the junction of the West Fork.

Records available.—One discharge measurement in 1911, one in 1912, and gage heights for 1912.

Drainage area.—187 square miles.

Gage.—Standard overhanging chain.

Channel.—Rock; probably permanent.

Discharge measurements.—Made by wading or from cable.

Winter flow.—Affected by ice.

Diversion.—None of importance.

Data insufficient for estimates of discharge.

The following discharge measurement was made by J. C. Beebe:

January 16, 1912: Gage height, 3.30 feet; discharge, 52 second-feet. Ice present in stream at gage.

Daily gage height, in feet, of Stillwater River near Nye, Mont., for 1912.

[B. F. Wood, observer.]

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1.....		3.3	3.5	5.5		5.3	4.2	3.8	4.0
2.....		3.3	3.6	5.7		5.2	4.2	3.8	4.0
3.....		3.4	3.6	5.7		5.2	4.2	3.8	4.0
4.....		3.5	3.5	5.8		5.1	4.1	4.1	3.9
5.....		3.5	3.6	5.9		5.0	4.1	4.1	3.8
6.....		3.5	3.7	5.9		4.9	4.1	4.1	3.8
7.....		3.3	3.7	6.2	5.4	4.7	4.1	4.1	3.7
8.....		3.3	3.9	6.5	5.3	4.6	4.0	4.1	3.7
9.....		3.3	3.9	5.7	5.3	4.6	4.0	4.1	3.7
10.....	2.8	3.3	4.0	6.4	5.2	4.5	4.0	4.0	3.7
11.....	2.8	3.3	4.0	6.1	5.3	4.5	4.0	4.0	3.7
12.....	2.8	3.3	4.0	6.1	5.5	4.5	4.0	4.0	3.6
13.....	2.8	3.2	3.9	6.0	5.9	4.4	4.0	4.0	3.6
14.....	2.8	3.2	4.0	6.0	5.9	4.4	4.0	4.0	3.5
15.....	2.8	3.2	4.0	5.9	5.7	4.3	4.0	3.9	3.5
16.....	2.8	3.2	4.1	5.4	5.7	4.3	4.0	3.9	3.5
17.....	3.0	3.3	4.2	5.3	5.6	4.2	4.0	3.9	
18.....	3.0	3.3	4.2	5.1	5.5	4.3	3.9	3.9	
19.....	3.0	3.3	4.3	5.3	6.1	4.3	3.9	3.9	
20.....	3.0	3.3	4.4	5.5	5.7	4.2	3.9	3.9	
21.....	3.0	3.4	4.6	5.8	5.7	4.2	3.9	3.9	
22.....	2.9	3.4	4.8	6.1	5.6	4.2	3.8	3.9	
23.....	2.9	3.5	4.6	6.4	5.4	4.2	3.8	3.8	
24.....	3.0	3.5	4.5	6.6	5.4	4.2	3.8	3.8	
25.....	3.0	3.5	4.5	6.5	5.2	4.2	3.8	3.8	
26.....	3.0	3.5	4.7	6.6	5.0	4.2	3.7	3.8	
27.....	3.0	3.6	4.7	6.7	4.9	4.2	3.7	3.8	
28.....	3.0	3.6	5.0	6.9	4.7	4.2	3.7	3.9	
29.....	3.0	3.6	5.4	6.7	4.8	4.2	3.8	4.0	
30.....	3.0	3.5	5.6	6.5	4.7	4.2	3.8	4.0	
31.....	3.3		5.8		4.7	4.2		4.0	

STILLWATER RIVER NEAR ABSAROKEE, MONT.

Location.—In the SE. $\frac{1}{4}$ SE. $\frac{1}{4}$ sec. 30, T. 3 S., R. 19 E., on the public highway bridge crossing the stream at the Riverside Road house, 13 miles southwest of Columbus, Mont., and about 1 mile northeast of Absarokee, Mont.; below the mouth of Rosebud Creek.

Records available.—July 19, 1910, to December 31, 1912.

Drainage area.—Not measured.

Gage.—Staff gage nailed to right abutment pier on upstream side of bridge.

Channel.—Bed of stream is very rough, being composed of gravel and bowlders, but is liable to shift slightly in high water.

Discharge measurements.—Made from the lower side of the bridge.

Winter flow.—Affected by ice.

Diversions.—The territory bordering Stillwater River is well irrigated by water taken from the river.

Accuracy.—Results fair.

Discharge measurements of Stillwater River near Absarokee, Mont., in 1912.

Date.	Hydrographer.	Gage height.	Discharge.
Jan. 17	J. C. Beebe.....	Feet.	Sec.-ft.
July 18	R. R. Randell.....	(a) 3.59	222 2,630

a Stream frozen solid at the gage.

Daily gage height, in feet, of Stillwater River near Absarokee, Mont., for 1912.

[S. A. Leaverton, observer.]

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	0.9	1.2	3.4	5.1	2.5	1.6	1.2	0.9
2	.4	1.3	3.8	4.0	3.0	1.5	1.1	1.0
3	.2	1.1	4.0	3.9	4.2	1.6	1.2	1.1
4	1.0	1.0	4.1	3.8	3.3	1.5	1.2	1.1
5	1.2	1.1	4.1	3.7	2.9	1.7	2.0	1.0
6	.5	1.1	4.2	3.4	2.7	1.5	1.7	1.1
7	.4	1.0	4.4	3.4	2.5	1.5	1.8	1.0
8	.5	1.1	4.7	3.2	2.6	1.3	1.7	1.1
9	.4	1.2	5.3	3.3	2.3	1.3	1.8	.9
10	.4	1.6	5.6	3.1	2.3	1.2	1.6	1.2
11	.5	1.7	4.7	3.2	2.2	1.2	1.6	1.2
12	.2	1.5	4.9	3.4	2.3	1.1	1.5	1.2
13	.3	1.5	5.1	3.7	2.1	1.1	1.5
14	.0	1.3	4.7	3.7	2.0	1.4	1.4
15	.2	1.3	4.3	3.9	1.9	1.5	1.5
16	.3	1.8	3.4	3.6	2.1	1.3	1.4
17	.2	1.8	3.3	3.6	2.1	1.3	1.4
18	.3	2.1	3.0	3.5	2.1	1.3	1.3
19	.2	2.4	2.9	3.5	1.9	1.5	1.4
20	.3	2.8	3.3	3.8	2.0	1.4	1.2
21	.3	2.9	4.1	3.8	1.8	1.4	1.2
22	.4	2.4	4.8	4.1	1.8	1.2	1.2
23	.6	2.5	5.1	4.0	1.6	1.3	1.3
24	.9	2.2	5.3	3.5	1.6	1.5	1.1
25	1.2	2.3	5.6	3.3	1.4	1.3	1.1
26	1.3	2.5	5.2	3.0	1.5	1.2	.9
27	1.2	2.5	5.4	3.0	1.4	1.3	1.1
28	1.3	2.8	5.2	2.8	1.7	1.2	1.2
29	1.3	2.4	5.3	2.9	1.8	1.3	1.2
30	1.6	3.3	5.2	2.6	1.9	1.1	1.1
31	3.8	2.6	1.6	1.0

Daily discharge, in second-feet, of Stillwater River near Absarokee, Mont., for 1912.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	550	700	2,860	5,440	1,720	940	700	550
2	300	760	3,420	3,720	2,320	880	650	600
3	230	650	3,720	3,570	4,020	940	700	650
4	600	600	3,870	3,420	2,720	880	700	650
5	700	650	3,870	3,280	2,190	1,000	1,220	600
6	350	650	4,020	2,860	1,950	880	1,000	650
7	300	600	4,320	2,860	1,720	880	1,070	600
8	350	650	4,800	2,580	1,830	760	1,000	650
9	300	700	5,760	2,720	1,500	760	1,070	550
10	300	940	6,240	2,450	1,500	700	940	700
11	350	1,000	4,800	2,580	1,400	700	940	700
12	230	880	5,120	2,860	1,500	650	880	700
13	260	880	5,440	3,280	1,310	650	880
14	170	760	4,800	3,280	1,220	820	820
15	230	760	4,170	3,570	1,140	880	880
16	260	1,070	2,860	3,140	1,310	760	820
17	230	1,070	2,720	3,140	1,310	760	820
18	260	1,310	2,320	3,000	1,310	760	760
19	230	1,610	2,190	3,000	1,140	880	820
20	260	2,070	2,720	3,420	1,220	820	700
21	260	2,190	3,870	3,420	1,070	820	700
22	300	1,610	4,960	3,870	1,070	700	700
23	400	1,720	5,440	3,720	940	760	760
24	550	1,400	5,760	3,000	940	880	650
25	700	1,500	6,240	2,720	820	760	650
26	760	1,720	5,600	2,320	880	700	550
27	700	1,720	5,920	2,320	820	760	650
28	760	2,070	5,600	2,070	1,000	700	700
29	760	1,610	5,760	2,190	1,070	760	700
30	940	2,720	5,600	1,830	1,140	650	650
31	3,420	1,830	940	600

NOTE.—Daily discharge determined from a fairly well-defined rating curve.

Monthly discharge of Stillwater River near Absarokee, Mont., for 1912.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accu- racy.
	Maximum.	Minimum.	Mean.		
April.....	940	170	420	25,000	B.
May.....	3,420	600	1,290	79,300	B.
June.....	6,240	2,190	4,490	267,000	B.
July.....	5,440	1,830	3,010	185,000	B.
August.....	4,020	820	1,450	89,200	B.
September.....	1,000	650	793	47,200	B.
October.....	1,220	550	796	48,900	B.
November 1-12.....	700	550	633	15,100	B.
The period.....				757,000	

WOODBINE CREEK NEAR NYE, MONT.

Location.—In the SE. $\frac{1}{4}$ sec. 32, T. 5 S., R. 15 E., 7 miles south of Nye, Mont., approximately a quarter of a mile from the junction of this creek and the Stillwater River.

Records available.—Two measurements in 1911, one in 1912, and scattering gage heights for 1912.

Gage.—Sloping staff.

Channel.—Large rocks; very rough.

Discharge measurements.—Made by wading.

Winter flow.—Affected by ice.

Diversion.—None.

Data insufficient for estimates of discharge.

Measurements are made at this station to determine the amount of water available for power. In the first mile from its mouth the creek has a fall of 900 feet, and there is at present an application for development of its power.

The following discharge measurement was made by J. C. Beebe:

January 16, 1912: Gage height, 2.35 feet; discharge, 4.6 second-feet. Ice present in stream at gage.

Daily gage height, in feet, of Woodbine Creek near Nye, Mont., for 1912.

[B. F. Wood, observer.]

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1.....							2.9	2.0	
2.....				5.3					
3.....									1.2
4.....						2.8		2.3	
5.....			3.1					2.3	
6.....								2.3	
7.....		2.0			4.1		2.7		
8.....									
9.....									
10.....									1.2
11.....						2.4			
12.....			3.5						
13.....								2.2	
14.....		2.0			3.9				
15.....							2.8		
16.....				4.0					
17.....									
18.....						2.2			
19.....			3.8						
20.....								2.2	
21.....					3.2				
22.....							2.0		
23.....				4.9					
24.....									
25.....						2.1			
26.....			4.0						
27.....								1.3	
28.....		2.1			3.0				
29.....							2.0		
30.....				3.7					
31.....	2.0								

ROSEBUD RIVER AT ABSAROKEE, MONT.

Location.—In the SW. $\frac{1}{4}$ SE. $\frac{1}{4}$ sec. 36, T. 3 S., R. 18 W., on the highway bridge just west of Absarokee, Mont., and 14 miles from Columbus, about 1 mile above the stream's junction with Stillwater River.

Records available.—July 19, 1910, to December 31, 1912.

Drainage area.—Not measured.

Gage.—Staff on downstream side of left abutment.

Channel.—Bed of stream is composed of gravel and boulders and is not likely to shift.

Discharge measurements.—Made from the downstream side of the bridge.

Winter flow.—Affected by ice.

Diversions.—Water for irrigation is diverted above the station.

Accuracy.—Results fair.

Discharge measurements of Rosebud River at Absarokee, Mont., in 1912.

Date.	Hydrographer.	Gage height.	Discharge.
Jan. 17	J. C. Beebe.....	<i>Feet.</i>	<i>Sec.-ft.</i>
July 18	R. R. Randell.....	(^a)	89
		3.36	1,320

^a Ice at the gage.

Daily gage height, in feet, of Rosebud River at Absarokee, Mont., for 1912.

[Chris. Carstens, observer.]

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1.....		1.75	2.35	3.5	3.9	3.45	2.75	2.55	2.35
2.....		2.25	2.4	3.35	4.5	3.55	2.75	2.55	2.35
3.....		2.65	2.25	3.5	4.4	3.65	2.65	2.55	2.4
4.....		2.7	2.3	3.45	3.85	3.55	2.7	2.6	2.35
5.....		3.1	2.25	3.55	3.3	3.5	2.65	2.65	2.35
6.....		2.95	2.35	3.6	3.3	3.35	2.55	2.55	2.35
7.....		2.4	2.5	3.55	3.35	3.25	2.45	2.65	2.35
8.....		2.2	2.45	3.9	3.45	3.25	2.45	2.75	2.4
9.....		1.95	2.8	4.0	3.35	3.25	2.5	2.8	2.35
10.....		2.5	2.9	4.0	3.35	3.3	2.45	2.85	2.35
11.....		2.45	3.15	4.3	3.5	3.25	2.45	2.85	2.35
12.....		2.5	3.0	4.1	3.45	3.25	2.45	2.85	2.25
13.....		2.7	2.95	4.0	3.35	3.25	2.55	2.75	2.3
14.....		2.6	2.9	3.65	3.35	3.25	2.6	2.8	2.25
15.....		2.6	2.85	3.45	3.35	3.3	2.55	2.75	2.25
16.....		2.35	2.75	3.4	3.3	3.25	2.55	2.75	2.25
17.....		2.2	2.9	3.25	3.25	3.25	2.65	2.65
18.....		2.05	2.85	3.15	3.35	3.15	2.65	2.65
19.....		2.1	2.9	3.05	3.35	3.15	2.8	2.6
20.....		2.25	2.85	3.0	3.65	3.0	2.75	2.55
21.....		2.35	3.0	3.15	3.6	2.95	2.75	2.55
22.....		2.2	3.2	3.35	3.45	2.85	2.65	2.55
23.....		2.3	3.1	3.55	3.35	2.85	2.65	2.45
24.....	1.8	2.3	3.0	3.7	3.35	2.75	2.6	2.5
25.....	1.8	2.4	2.95	3.9	3.35	2.9	2.55	2.45
26.....	1.8	2.35	2.95	3.95	3.4	2.85	2.55	2.45
27.....	1.9	2.5	3.0	4.2	3.25	2.85	2.55	2.45
28.....	1.9	2.55	3.05	4.0	3.25	2.85	2.55	2.45
29.....	2.2	2.7	3.3	3.95	3.25	2.85	2.5	2.4
30.....	2.05	2.65	3.4	3.95	3.35	2.8	2.45	2.35
31.....	2.0	3.45	3.4	2.75	2.35

Daily discharge, in second-feet, of Rosebud River at Absarokee, Mont., for 1912.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1.....		125	325	1,470	2,150	1,400	590	445	325
2.....		280	350	1,250	3,350	1,550	590	445	325
3.....		515	280	1,470	3,150	1,720	515	445	350
4.....		550	300	1,400	2,060	1,550	550	490	325
5.....		930	280	1,550	1,180	1,470	515	515	325
6.....		770	325	1,630	1,180	1,250	445	445	325
7.....		350	410	1,550	1,250	1,120	380	515	325
8.....		260	380	2,150	1,400	1,120	380	590	350
9.....		175	630	2,350	1,250	1,120	410	630	325
10.....		410	720	2,350	1,250	1,180	380	675	325
11.....		380	990	2,950	1,470	1,120	380	675	325
12.....		410	820	2,550	1,400	1,120	380	675	280
13.....		550	770	2,350	1,250	1,120	445	590	300
14.....		480	720	1,720	1,250	1,120	480	630	280
15.....		480	675	1,400	1,250	1,180	445	590	280
16.....		325	590	1,320	1,180	1,120	445	590	280
17.....		260	720	1,120	1,120	1,120	515	515
18.....		208	675	990	1,250	990	515	515
19.....		225	720	875	1,250	990	630	480
20.....		280	675	820	1,720	820	590	445
21.....		325	820	990	1,630	770	590	445
22.....		260	1,050	1,250	1,400	675	515	445
23.....		300	930	1,550	1,250	675	515	380
24.....	135	300	820	1,800	1,250	590	480	410
25.....	135	350	770	2,150	1,250	720	445	380
26.....	135	325	770	2,250	1,320	675	445	380
27.....	160	410	820	2,750	1,120	675	445	380
28.....	160	445	875	2,350	1,120	675	445	380
29.....	260	550	1,180	2,250	1,120	675	410	350
30.....	208	515	1,320	2,250	1,250	630	380	325
31.....	190	1,400	1,320	590	325

NOTE.—Daily discharge determined from a fairly well-defined rating curve. The accuracy of gage readings for March and April is somewhat doubtful.

Monthly discharge of Rosebud River at Absarokee, Mont., for 1912.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accu- racy.
	Maximum.	Minimum.	Mean.		
March 24-31.....	260	135	173	2,750	D.
April.....	930	125	391	23,300	D.
May.....	1,400	280	713	43,800	B.
June.....	2,950	820	1,760	105,000	B.
July.....	3,350	1,120	1,460	89,800	B.
August.....	1,720	590	1,020	62,700	B.
September.....	630	380	475	28,300	B.
October.....	675	325	487	29,900	B.
November 1-16.....	350	280	315	10,000	B.
The period.....				396,000	

CLARK FORK AT FROMBERG, MONT.

Location.—In sec. 21, T. 5 S., R. 23 E., at the highway bridge half a mile east of the Northern Pacific Railway station at Fromberg, Mont.

Records available.—June 3, 1905, to December 31, 1912.

Drainage area.—2,500 square miles.

Gage.—A standard chain fastened to upstream side of bridge; datum unchanged. The original gage was a staff; its datum was the same as that of the chain gage.

Channel.—Bed of stream composed of rock and gravel; free from vegetation; permanent. Channel divided by middle pier of bridge.

Discharge measurements.—Made from bridge.

Winter flow.—Affected by ice.

Diversions.—Many diversions are made from the river, but only a small portion of the total flow is used.

Accuracy.—Records excellent.

The following discharge measurement was made by R. R. Randall:

July 17, 1912: Gage height, 6.07 feet; discharge, 3,050 second-feet.

Daily gage height, in feet, of Clark Fork at Fromberg, Mont., for 1912.

[Mrs. E. V. Moran, observer.]

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1.....		3.6	3.75	7.0	6.9	3.7	4.3	4.1	4.2
2.....		3.55	3.7	7.0	7.6	3.6	4.3	4.1	4.1
3.....		3.55	3.7	7.1	7.9	9.3	4.3	4.1	3.95
4.....		3.5	3.65	7.2	7.8	8.0	4.1	4.1	3.9
5.....		3.65	3.7	7.2	7.8	7.8	4.1	4.1	3.9
6.....		3.65	3.8	7.4	7.7	5.8	4.1	4.1	3.8
7.....		3.65	3.75	7.5	7.6	5.1	4.1	4.0	3.75
8.....		3.6	3.8	7.5	7.4	5.0	4.1	4.0	3.65
9.....		3.6	3.9	7.4	6.9	4.8	4.1	3.9	3.75
10.....		3.6	3.95	7.6	6.9	4.75	4.1	3.9	3.7
11.....		3.65	3.95	7.7	6.8	4.65	4.1	3.8
12.....		3.7	4.15	7.7	6.6	4.6	4.1	3.8
13.....		3.7	4.5	7.7	6.2	4.6	4.1	3.8
14.....		3.7	4.7	7.8	6.1	4.6	4.2	3.8
15.....	3.4	3.7	4.7	7.8	6.0	4.6	4.3	3.8
16.....	3.45	3.75	4.9	8.1	6.0	4.5	4.3	3.7
17.....	3.4	3.7	5.2	8.4	6.2	4.5	4.2	3.7
18.....	3.45	3.7	5.4	8.5	6.2	4.5	4.2	3.7
19.....	3.4	3.7	5.6	8.8	6.0	4.5	4.2	3.7
20.....	3.4	3.7	5.6	8.7	5.8	4.5	4.2	3.6
21.....	3.45	3.75	5.6	8.4	5.8	4.5	4.6	3.6
22.....	3.4	3.7	5.6	8.9	5.7	4.5	5.1	3.6
23.....	3.65	3.7	6.0	8.7	5.1	4.5	4.9	3.6
24.....	3.6	3.7	6.2	8.8	4.15	4.5	4.7	3.6
25.....	3.6	3.7	6.6	8.8	4.05	4.4	4.5	3.6
26.....	3.65	3.75	6.2	8.6	4.0	4.4	4.5	3.55
27.....	3.6	3.7	6.1	8.4	4.0	4.4	4.4	3.6
28.....	3.65	3.7	6.0	8.1	3.85	4.4	4.25	3.75
29.....	3.6	3.7	6.5	7.7	3.8	4.3	4.2	3.9
30.....	3.6	3.7	6.6	7.4	3.7	4.3	4.2	4.1
31.....	3.65				3.7	4.3	4.15

Daily discharge, in second-feet, of Clark Fork at Fromberg, Mont., for 1912.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1.....		375	460	4,630	4,440	430	860	700	780
2.....		350	430	4,630	5,980	375	860	700	700
3.....		350	430	4,840	6,760	10,900	860	700	590
4.....		325	402	5,050	6,490	7,030	700	700	555
5.....		402	430	5,050	6,490	6,490	700	700	555
6.....		402	490	5,500	6,230	2,560	700	700	490
7.....		402	460	5,740	5,980	1,680	700	625	460
8.....		375	490	5,740	5,500	1,560	700	625	402
9.....		375	555	5,500	4,440	1,340	700	555	460
10.....		375	590	5,980	4,440	1,280	700	555	430
11.....		402	590	6,230	4,240	1,180	700	490
12.....		430	740	6,230	3,880	1,130	700	490
13.....		430	1,040	6,230	3,180	1,130	700	490
14.....		430	1,230	6,490	3,020	1,130	780	490
15.....	275	430	1,230	6,490	2,860	1,130	860	490
16.....	300	460	1,440	7,330	2,860	1,040	860	430
17.....	275	430	1,800	8,210	3,180	1,040	780	430
18.....	300	430	2,040	8,510	3,180	1,040	780	430
19.....	275	430	2,290	9,410	2,860	1,040	780	430
20.....	275	430	2,290	9,110	2,560	1,040	780	375

Daily discharge, in second-feet, of Clark Fork at Fromberg, Mont., for 1912—Contd.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
21.....	300	460	2,290	8,210	2,560	1,040	1,130	375
22.....	275	430	2,290	9,710	2,420	1,040	1,680	375
23.....	402	430	2,860	9,110	1,680	1,040	1,440	375
24.....	375	430	3,180	9,410	740	1,040	1,230	375
25.....	375	430	3,880	9,410	662	945	1,040	375
26.....	402	460	3,180	8,810	625	945	1,040	350
27.....	375	430	3,020	8,210	625	945	945	375
28.....	402	430	2,860	7,330	522	945	820	460
29.....	375	430	3,700	6,230	490	860	780	555
30.....	375	430	3,880	5,500	430	860	780	700
31.....	402	4,260	430	860	740

NOTE.—Daily discharge determined from a well-defined rating curve.

Monthly discharge of Clark Fork at Fromberg, Mont., for 1912.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accu- racy.
	Maximum.	Minimum.	Mean.		
March 15-31.....	402	275	339	11,400	A.
April.....	460	325	413	24,600	A.
May.....	4,260	402	1,770	109,000	A.
June.....	9,710	4,630	6,960	414,000	A.
July.....	6,760	430	3,220	188,000	A.
August.....	10,900	375	1,780	109,000	A.
September.....	1,680	700	870	51,800	A.
October.....	740	350	521	32,000	A.
November 1-10.....	780	402	542	10,800	A.
The period.....				961,000	

PRYOR CREEK NEAR COBURN, MONT.

Location.—At the ranch of John A. Hoyt, near Coburn, Mont., near south line of T. 1 S., R. 27 E.

Records available.—September 13, 1911, to December 31, 1912.

Gage.—Overhanging chain gage on left bank opposite the farmhouse of John A. Hoyt.

Channel.—Permanent. The bed of the stream at the gage is composed of gravel and sand, but at the control both above and below it is firm gravel and cobblestones.

At low stages the water is deep and sluggish at the gage and for several hundred feet above and below.

Discharge measurement.—Made by wading above the gage.

Winter flow.—Channel is blocked with ice during winter months.

Diversion.—Water sufficient to irrigate approximately 1,000 acres near Pryor, about 30 miles above this station.

Discharge measurements of Pryor Creek near Coburn, Mont., in 1911 and 1912.

Date.	Hydrographer.	Gage height.	Dis- charge.
1911. Sept. 13	W. A. Lamb.....	<i>Feet.</i> 4.00	<i>Sec.-ft.</i> 23
1912. Apr. 23do.....	5.20	159
May 22do.....	6.35	267
Oct. 24	R. R. Randell.....	4.31	50

Daily gage height, in feet, and discharge, in second-feet, of Pryor Creek near Coburn, Mont., for 1911.

[John A. Hoyt, observer.]

Day.	Sept.		Oct.		Nov.		Dec.	
	Gage height.	Dis-charge.	Gage height.	Dis-charge.	Gage height.	Dis-charge.	Gage height.	Dis-charge.
1.....	-----	-----	4.0	23	4.0	23	4.05	28
2.....	-----	-----	4.0	23	4.0	23	4.05	28
3.....	-----	-----	4.0	23	4.0	23	4.05	28
4.....	-----	-----	4.0	23	4.0	23	4.05	28
5.....	-----	-----	4.0	23	4.0	23	4.05	28
6.....	-----	-----	4.0	23	4.0	23	4.05	28
7.....	-----	-----	4.0	23	4.0	23	4.05	28
8.....	-----	-----	4.0	23	4.0	23	4.05	28
9.....	-----	-----	4.0	23	4.0	23	4.05	28
10.....	-----	-----	4.0	23	4.0	23	4.0	23
11.....	-----	-----	4.0	23	4.0	23	4.0	23
12.....	-----	-----	4.0	23	4.0	23	4.0	23
13.....	-----	-----	4.0	23	4.0	23	4.0	23
14.....	4.0	23	4.0	23	4.0	23	4.0	23
15.....	4.0	23	4.0	23	4.0	23	4.0	23
16.....	4.0	23	4.0	23	4.0	23	4.0	23
17.....	4.0	23	4.0	23	4.0	23	-----	24
18.....	4.0	23	4.0	23	4.0	23	-----	24
19.....	4.0	23	4.0	23	4.05	28	-----	25
20.....	4.0	23	4.0	23	4.05	28	-----	26
21.....	4.0	23	4.0	23	4.05	28	-----	26
22.....	4.0	23	4.0	23	4.05	28	-----	27
23.....	4.0	23	4.0	23	4.05	28	-----	27
24.....	4.0	23	4.0	23	4.05	28	4.05	28
25.....	4.0	23	4.0	23	4.05	28	4.05	28
26.....	4.0	23	4.0	23	4.05	28	4.05	28
27.....	4.0	23	4.0	23	4.05	28	4.05	28
28.....	4.0	23	4.0	23	4.05	28	4.05	28
29.....	4.0	23	4.05	28	4.05	28	4.05	28
30.....	4.0	23	4.05	28	4.05	28	4.05	28
31.....	-----	-----	4.05	28	-----	-----	-----	28

NOTE.—Daily discharge determined from a rating curve well defined between gage heights 4 feet and 7 feet. Discharge interpolated Dec. 7-23.

Daily gage height, in feet, of Pryor Creek near Coburn, Mont., for 1912.

[John A. Hoyt, observer.]

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1.....	8.6	4.4	5.5	7.9	4.6	4.1	4.15	4.9
2.....	8.8	4.5	5.4	8.8	4.5	4.1	4.15	4.6
3.....	7.2	4.5	5.4	9.8	4.5	4.15	4.15	4.7
4.....	8.3	6.2	5.3	7.8	4.4	4.2	4.15	4.7
5.....	8.2	6.9	5.4	5.8	4.3	4.9	4.5	4.6
6.....	7.8	6.3	5.3	5.5	4.3	4.2	6.1	4.7
7.....	7.3	5.1	5.6	5.7	4.35	4.2	5.7	4.7
8.....	6.4	5.0	5.8	5.6	4.2	4.7	4.7	4.8
9.....	4.9	4.9	5.8	5.5	4.25	5.6	4.6	4.7
10.....	4.6	4.8	5.6	5.3	4.2	6.3	4.6	-----
11.....	4.05	4.5	4.8	4.9	4.2	6.0	4.6	-----
12.....	4.05	4.6	4.7	4.8	4.25	5.7	4.5	-----
13.....	4.7	4.6	4.7	4.7	4.2	5.1	4.4	-----
14.....	4.8	4.6	4.8	4.5	4.25	4.7	4.5	-----
15.....	4.9	4.6	4.7	4.4	4.2	4.7	4.4	-----
16.....	5.6	4.7	4.6	4.4	4.2	4.6	4.5	-----
17.....	5.9	4.8	4.7	4.45	4.25	5.6	4.4	-----
18.....	6.1	4.8	4.6	4.45	4.2	5.5	4.4	-----
19.....	6.7	4.6	4.6	4.45	4.25	5.5	4.3	-----
20.....	8.1	9.9	4.6	4.45	4.2	5.5	4.4	-----

Daily gage height, in feet, of Pryor Creek near Coburn, Mont., for 1912—Continued.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
21.....	8.8	8.8	4.4	4.4	4.2	4.6	4.3
22.....	9.5	6.0	4.5	4.35	4.1	4.5	4.4
23.....	5.3	6.1	4.4	4.35	4.1	4.5	4.3
24.....	5.1	5.2	4.5	4.35	4.1	4.5	4.4
25.....	5.1	5.5	4.5	4.35	4.1	4.6	4.3
26.....	4.9	5.4	4.4	4.3	4.1	4.5	4.3
27.....	4.9	5.6	4.5	4.25	4.1	4.25	4.4
28.....	5.1	5.8	4.4	4.25	4.1	4.3	4.4
29.....	4.5	5.7	4.5	4.25	4.1	4.25	5.1
30.....	4.5	5.6	4.5	4.25	4.1	4.3	5.2
31.....	5.6	4.35	4.1	5.1

Daily discharge, in second-feet, of Pryor Creek near Coburn, Mont., for 1912.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1.....	568	60	180	477	80	32	36	111
2.....	594	70	168	594	70	32	36	80
3.....	386	70	168	732	70	36	36	90
4.....	529	264	156	404	60	41	36	90
5.....	516	348	168	216	50	41	70	80
6.....	464	276	156	180	50	41	252	90
7.....	399	133	192	204	55	41	204	90
8.....	288	122	216	192	41	41	90	100
9.....	111	111	216	180	46	192	80	90
10.....	80	100	192	156	41	276	80
11.....	28	70	100	111	41	240	80
12.....	28	80	90	100	46	204	70
13.....	90	80	90	90	41	133	60
14.....	100	80	100	70	46	90	70
15.....	111	80	90	60	41	90	60
16.....	192	90	80	60	41	80	70
17.....	228	100	90	65	46	192	60
18.....	252	100	80	65	41	180	60
19.....	324	80	80	65	46	180	50
20.....	503	746	80	65	41	180	60
21.....	594	594	60	60	41	80	50
22.....	690	240	70	55	32	70	60
23.....	156	252	60	55	32	70	50
24.....	133	144	70	55	32	70	60
25.....	133	180	70	55	32	80	50
26.....	111	168	60	50	32	70	50
27.....	111	192	70	46	32	46	60
28.....	133	216	60	46	32	50	60
29.....	70	204	70	46	32	46	133
30.....	70	192	70	46	32	50	144
31.....	192	55	32	133

NOTE.—Daily discharge determined from a rating curve well defined between gage heights 4 feet and 7 feet and fairly well defined at higher stages.

Monthly discharge of Pryor Creek near Coburn, Mont., for 1911 and 1912.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accu- racy.
	Maximum.	Minimum.	Mean.		
September 14-30.....	23	23	23.0	776	A.
October.....	28	23	23.5	1,440	A.
November.....	28	23	25.0	1,490	A.
December.....	28	23	26.3	1,620	B.
The period.....	5,300
April.....	690	28	266	15,800	B.
May.....	746	60	182	11,200	B.
June.....	216	60	112	6,660	A.
July.....	732	46	152	9,350	A.
August.....	80	32	43.7	2,690	A.
September.....	276	32	99.1	5,900	A.
October.....	252	36	77.7	4,780	A.
November 1-9.....	111	80	91.2	1,630	B.
The period.....	58,000

PRYOR CREEK AT HUNTLEY, MONT.

Location.—In the SW. $\frac{1}{4}$ sec. 25, T. 2 N., R. 27 E., at the steel highway bridge, half a mile from the railroad station at Huntley.

Records available.—August 6, 1904, to December 31, 1912.

Drainage area.—800 square miles.

Gage.—Chain; installed June 16, 1906, at the highway bridge crossing the new channel, into which the creek was at that time turned by the United States Reclamation Service; datum unchanged since 1906.

Channel.—Bed composed of clay and gravel and may change somewhat; banks steep and uniformly graded, clean, and not subject to overflow; current moderate.

Discharge measurements.—Made from the bridge to which the gage is attached, or by wading.

Winter flow.—Stream freezes over during the winter months.

Discharge measurements of Pryor Creek at Huntley, Mont., in 1912.

Date.	Hydrographer.	Gage height.	Dis-charge.	Date.	Hydrographer.	Gage height.	Dis-charge.
Apr. 9	W. A. Lamb.....	<i>Feet.</i> 1.87	<i>Sec.-ft.</i> 101	Aug. 22	R. Randell.....	<i>Feet.</i> 1.35	<i>Sec.-ft.</i> 29
May 20do.....	4.35	701	Oct. 23do.....	1.64	52
June 23do.....	1.65	58				

Daily gage height, in feet, of Pryor Creek at Huntley, Mont., for 1912.

[Arthur Foster, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1.....	1.65	3.2	2.0	2.7	1.8	2.45	2.4	1.38	1.23	1.66	1.63	1.87
2.....	1.65	3.2	2.0	2.8	2.0	2.4	4.7	1.38	1.23	1.68	1.67	1.88
3.....	1.9	3.2	2.1	3.0	2.35	2.4	7.2	1.38	1.23	1.70	1.70	1.89
4.....	2.1	3.0	2.15	3.0	2.4	2.35	4.8	1.38	1.23	1.72	1.77	1.87
5.....	2.1	2.8	2.15	2.7	3.4	2.3	3.2	1.38	1.32	2.0	1.79	1.89
6.....	2.1	2.8	2.15	2.4	3.5	2.3	2.8	1.38	1.37	2.05	1.82	1.88
7.....	2.3	2.3	2.15	2.1	2.8	2.2	2.25	1.38	1.39	2.05	1.85	1.90
8.....	2.3	2.25	2.25	1.8	2.7	2.1	2.2	1.38	1.39	2.05	1.83	1.66
9.....	2.35	2.2	2.25	1.75	2.3	2.05	1.9	1.36	1.39	2.05	1.79	1.66
10.....	2.35	2.2	2.25	1.85	2.25	2.0	1.8	1.36	1.39	2.05	1.80	1.66
11.....	2.35	3.2	2.25	2.05	2.1	1.95	1.8	1.36	1.39	2.0	1.82	1.67
12.....	2.35	2.8	2.25	2.1	2.0	1.9	1.7	1.36	1.39	1.75	1.81	1.65
13.....	2.35	3.0	2.25	2.4	2.0	2.0	1.7	1.36	1.39	1.70	1.78	1.65
14.....	2.5	2.6	2.25	2.6	2.0	2.0	1.65	1.33	1.41	1.66	1.77	1.63
15.....	2.5	2.7	2.5	2.8	2.0	2.0	1.65	1.33	1.43	1.68	1.75	1.62
16.....	2.5	2.7	2.4	2.8	2.0	2.0	1.6	1.33	1.80	1.70	1.73	1.62
17.....	2.5	2.4	2.3	2.8	1.95	2.05	1.6	1.33	2.1	1.72	1.70	1.61
18.....	2.5	2.45	2.3	2.8	1.95	1.9	1.6	1.33	2.1	1.75	1.68	1.59
19.....	2.5	2.5	2.3	2.7	1.95	1.8	1.6	1.33	2.15	2.0	1.64	1.58
20.....	2.5	2.5	2.3	2.7	2.05	1.75	1.6	1.33	2.15	1.82	1.63	1.57
21.....	2.4	2.5	2.35	4.8	4.7	1.7	1.55	1.35	2.05	1.70	1.63	1.57
22.....	2.35	2.4	2.45	3.7	3.2	1.7	1.55	1.34	2.0	1.68	1.62	1.58
23.....	2.35	2.25	2.6	2.4	2.9	1.65	1.5	1.30	1.75	1.64	1.62	1.58
24.....	2.35	2.25	2.8	2.3	2.7	1.6	1.5	1.29	1.50	1.61	1.64	1.68
25.....	2.3	2.2	4.6	2.25	2.5	1.6	1.4	1.26	1.48	1.59	1.68	1.73
26.....	2.3	2.2	4.1	2.2	2.5	1.5	1.4	1.24	1.52	1.57	1.72	1.83
27.....	2.3	2.2	4.6	2.15	2.5	1.45	1.4	1.24	1.56	1.70	1.77	1.83
28.....	2.3	2.1	4.9	2.15	2.45	1.44	1.35	1.24	1.60	1.70	1.81	1.83
29.....	2.3	2.1	4.7	2.05	2.45	1.40	1.35	1.24	1.62	1.68	1.83	1.88
30.....	2.45	4.1	1.9	2.45	1.40	1.35	1.23	1.63	1.66	1.86	1.93
31.....	3.0	2.4	2.45	1.38	1.23	1.62	1.96

NOTE.—Jan. 1 to Mar. 24 and Nov. 3 to Dec. 31, relation of gage height to discharge affected by ice.

Daily discharge, in second-feet, of Pryor Creek at Huntley, Mont., for 1912.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1.		258	79	206	196	31	19	60	57
2.		282	116	196	810	31	19	63	61
3.		330	186	196	1,560	31	19	65	
4.		330	196	186	840	31	19	68	
5.		258	434	176	382	31	26	116	
6.		196	460	176	282	31	30	126	
7.		136	282	156	166	31	32	126	
8.		79	258	136	156	31	32	126	
9.		72	176	126	96	29	32	126	
10.		88	166	116	79	29	32	126	
11.		126	136	106	79	29	32	116	
12.		136	116	96	65	29	32	72	
13.		196	116	116	65	29	32	65	
14.		236	116	116	59	27	34	60	
15.		282	116	116	59	27	36	63	
16.		282	116	116	53	27	79	65	
17.		282	106	126	53	27	136	68	
18.		282	106	96	53	27	136	72	
19.		258	106	79	53	27	146	116	
20.		258	126	72	53	27	146	82	
21.		840	810	65	48	28	126	65	
22.		516	382	65	48	28	116	63	
23.		196	306	59	42	24	72	58	
24.		176	258	53	42	23	42	54	
25.	780	166	216	53	33	21	40	52	
26.	630	156	216	42	33	20	44	50	
27.	780	146	216	38	33	20	49	65	
28.	870	146	206	37	28	20	53	65	
29.	810	126	206	33	28	20	55	63	
30.	630	96	206	33	28	19	57	60	
31.	196		206		31	19		55	

NOTE.—Daily discharge determined from a fairly well defined rating curve.

Monthly discharge of Pryor Creek at Huntley, Mont., for 1912.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accu- racy.
	Maximum.	Minimum.	Mean.		
March 25-31.	870	196	671	9,320	B.
April.	840	72	231	13,700	B.
May.	810	79	217	13,300	B.
June.	206	33	106	6,310	B.
July.	1,560	28	179	11,000	B.
August.	31	19	26.6	1,640	B.
September.	146	19	57.4	3,420	B.
October.	126	50	78.4	4,820	B.
The period.				63,500	

WIND RIVER AT DUBOIS, WYO.

Location.—At Dubois, in sec. 7, T. 41 N., R. 106 W., just below the mouth of Horse Creek, the nearest tributary.

Records available.—August 4, 1910, to June 7, 1912.

Drainage area.—Not measured.

Gage.—Vertical staff.

Channel.—Data to meager to determine.

Discharge measurements.—Made by wading.

Winter flow.—Springs keep the river open during the winter months.

Diversions.—A number of irrigation ditches divert water above the station.

Accuracy.—Sufficient discharge measurements have not been made to afford a basis for estimates of flow.

Cooperation.—Station maintained in cooperation with the United States Forest Service.

The following discharge measurement was made by Brown and French:
January 31, 1912: Gage height, 5.75 feet; discharge, 163 second-feet.

Daily gage height, in feet, of Wind River at Dubois, Wyo., for 1912.

[H. Earl French, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	Day.	Jan.	Feb.	Mar.	Apr.	May.	June.
1.	5.8	5.72	5.7	5.85	5.92	7.95	16.	5.7	5.72	5.72	5.82	6.28
2.	5.8	5.72	5.72	6.0	5.8	8.58	17.	5.7	5.72	5.72	5.85	6.5
3.	5.8	5.72	5.72	5.85	5.85	9.15	18.	5.7	5.72	5.72	5.88	6.72
4.	5.8	5.72	5.7	5.85	5.8	9.0	19.	5.7	5.72	5.75	5.88	6.85
5.	5.8	5.73	5.7	5.75	5.8	9.12	20.	5.7	5.72	5.72	5.7	7.2
6.	5.8	5.73	5.72	5.75	5.78	9.28	21.	5.7	5.72	5.7	5.8	7.05
7.	5.8	5.75	5.75	5.8	5.85	9.82	22.	5.75	5.72	5.7	5.8	6.82
8.	5.8	5.75	5.75	5.88	5.95	23.	5.75	5.72	5.75	5.82	6.6
9.	5.7	5.75	5.72	5.92	6.1	24.	5.75	5.72	5.75	5.82	6.48
10.	5.6	5.73	5.72	6.02	6.2	25.	5.75	5.72	5.8	5.88	6.82
11.	5.7	5.72	5.7	5.88	6.15	26.	5.75	5.72	5.8	5.88	7.08
12.	5.7	5.72	5.7	5.88	6.1	27.	5.75	5.7	5.8	5.8	6.85
13.	5.7	5.72	5.72	5.78	6.0	28.	5.75	5.7	5.8	5.88	6.75
14.	5.7	5.72	5.72	5.82	6.0	29.	5.75	5.72	5.8	5.88	7.0
15.	5.7	5.72	5.7	5.82	6.0	30.	5.75	5.8	5.92	7.85
							31.	5.75	5.8	7.85

WIND RIVER AT RIVERTON, WYO.

Location.—At highway bridge in sec. 2, T. 1 S., R. 4 E., three-fourths of a mile east of Riverton and three-fourths of a mile above the mouth of Little Wind River.

Records available.—May 15, 1911, to October 31, 1912. From May 14, 1906, to November 1, 1908, a station was maintained at Walker's Ferry, about 1 mile above the present station. As no streams enter between, the records at the two points are comparable.

Drainage area.—2,090 square miles (measured from land office map).

Gage.—Chain gage.

Channel.—Shifting after high water.

Discharge measurements.—Made from bridge.

Winter flow.—Ice causes backwater during the winter months and discharge measurements are made to determine the approximate flow.

Diversions.—Prior to July 1, 1912, there were adjudicated diversions of 34 second-feet from Wind River above the station and of 91 second-feet from tributaries entering above.

Accuracy.—Although the channel shifted after the high water of 1912, sufficient discharge measurements have been obtained to make the estimates reliable.

Discharge measurements of Wind River at Riverton, Wyo., in 1912.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
Feb. 9	R. H. Fletcher ^a	<i>Feet.</i> 7.20	<i>Sec.-ft.</i> 356	July 25	R. H. Fletcher	<i>Feet.</i> 7.83	<i>Sec.-ft.</i> 3,510
Mar. 11	do. ^a	5.50	351	Aug. 29	do.	6.43	1,660
May 27	do.	6.50	1,960	Oct. 27	do.	4.87	591
June 27	do.	9.45	7,510				

^a Measurement made at lower side of bridge under complete ice cover. Ice frozen solid around gage. Channel partly open for several hundred feet above station, but closed below at control.

Daily gage height, in feet, of Wind River at Riverton, Wyo., for 1912.

[Francis Feris, observer.]

Day.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
1.				4.47	7.8	9.0	8.1	6.3	5.3
2.				4.36	8.1	8.8	8.6	6.1	5.2
3.			5.3	4.43	8.6	8.6	8.8	6.05	5.15
4.				4.5	9.0	8.3	8.4	5.85	5.25
5.				4.44	9.0	8.2	7.8	5.6	5.4
6.		5.4		4.42	9.2	8.4	7.5	5.7	5.5
7.				4.38	9.4	8.0	7.3	5.45	5.45
8.				4.4	9.8	7.9	7.1	5.35	5.4
9.				4.47	9.9	7.9	6.95	5.65	5.25
10.			4.7	4.8	9.8	7.8	6.8	5.8	5.45
11.	6.25		5.1	4.87	9.4	7.6	6.65	5.75	5.15
12.				4.57	5.05	9.1	7.6	5.55	5.25
13.				4.67	4.87	9.3	7.7	6.15	5.65
14.		5.5		4.47	4.78	9.3	7.7	6.5	5.65
15.				4.37	4.7	8.8	7.9	6.5	5.15
16.	5.9			4.44	4.67	8.6	7.7	6.65	5.55
17.				4.4	5.3	7.9	7.8	6.65	5.5
18.	6.0			4.34	5.7	7.5	7.9	6.8	5.45
19.				4.46	6.2	7.4	7.9	6.75	5.45
20.		5.15		4.44	6.45	7.8	8.4	6.65	5.45
21.				4.34	6.65	8.2	8.2	6.55	5.35
22.				4.4	6.6	8.5	8.2	6.05	5.4
23.	5.7			4.4	6.1	8.9	8.2	6.1	5.3
24.				4.38	5.85	9.2	8.0	6.05	5.3
25.		4.9		4.46	5.6	9.4	7.8	5.95	5.35
26.				4.48	6.2	9.4	7.5	5.9	5.25
27.				4.46	6.45	9.4	7.3	5.85	5.25
28.				4.44	6.4	9.4	7.2	5.85	5.35
29.	5.4	5.2		4.43	6.25	9.2	7.0	6.05	5.35
30.				4.47	7.0	9.1	7.1	6.35	5.15
31.					7.6		7.4	6.4	4.87

NOTE.—Feb. 11 to Apr. 3, relation of gage height to discharge affected by ice.

Daily discharge, in second-feet, of Wind River at Riverton, Wyo., for 1912.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
1.		421	3,540	6,140	4,110	1,550	800
2.		388	4,110	5,660	5,200	1,380	740
3.		409	5,200	5,200	5,660	1,340	712
4.		430	6,140	4,530	4,750	1,180	770
5.		412	6,140	4,320	3,540	1,000	865
6.		406	6,630	4,750	3,040	1,070	930
7.		394	7,130	3,910	2,740	898	898
8.		400	8,180	3,720	2,460	832	865
9.		421	8,450	3,720	2,260	1,040	770
10.	500	540	8,180	3,540	2,080	1,140	898
11.		685	572	7,130	3,200	1,900	1,110
12.		455	660	6,380	3,200	1,740	965
13.		490	572	6,880	3,370	1,420	1,040
14.		421	532	6,880	3,370	1,740	1,040
15.		391	500	5,660	3,720	1,740	1,000
16.		412	490	5,200	3,370	1,900	965
17.		400	800	3,720	3,540	1,900	930
18.		382	1,070	3,040	3,720	2,080	898
19.		418	1,460	2,890	3,720	2,020	898
20.		412	1,690	3,540	4,750	1,900	898
21.		382	1,900	4,320	4,320	1,800	832
22.		400	1,850	4,970	4,320	1,340	865
23.		400	1,380	5,900	4,320	1,380	800
24.		394	1,180	6,630	3,910	1,340	800
25.		418	1,000	7,130	3,540	1,260	832
26.		424	1,460	7,130	3,040	1,220	770
27.		418	1,690	7,130	2,740	1,180	770
28.		412	1,640	7,130	2,600	1,180	832
29.		409	1,500	6,630	2,330	1,340	832
30.		421	2,330	6,380	2,460	1,600	712
31.			3,200		2,890	1,640	

NOTE.—Daily discharge computed from a well-defined curve. Mean discharge Apr. 1-9, estimated at 350 second-feet. Mean monthly discharge January and February estimated on basis of two ice measurements and climatologic data.

Monthly discharge of Wind River at Riverton, Wyo., for 1912.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accu- racy.
	Maximum.	Minimum.	Mean.		
February.....			355	20,400	D.
March.....			350	30,700	D.
April.....	685		406	24,200	C.
May.....	3,200	388	1,020	62,700	B.
June.....	8,450	2,890	5,950	354,000	B.
July.....	6,140	2,330	3,800	234,000	B.
August.....	5,660	1,180	2,240	133,000	B.
September.....	1,550	712	974	58,000	B.
October.....	930	536	709	43,600	B.
The period.....				966,000	

a Estimated.

BIGHORN RIVER AT THERMOPOLIS, WYO.

Location.—In sec. 19, T. 43 N., R. 95 W., on the public highway bridge between Thermopolis and the Thermopolis Hot Springs.

Records available.—May 28, 1900, to December 31, 1905; June 30, 1910, to October 7, 1912.

Drainage area.—8,180 square miles.

Gage.—Staff, fastened securely to the downstream side of the middle pier; datum unchanged.

Channel.—The bed of the stream is composed of rock and gravel and is practically permanent.

Discharge measurements.—Made from the highway bridge.

Winter flow.—Little affected by ice.

Diversions.—Irrigation is carried on extensively on the tributaries of Bighorn River, but not from the river itself.

Accuracy.—Results fair.

Discharge measurements of Bighorn River at Thermopolis, Wyo., in 1912.

Date.	Hydrographer.	Gage height.	Dis- charge.
		<i>Fect.</i>	<i>Sec.-ft.</i>
June 18	W. A. Lamb.....	5.00	7,460
Aug. 13	R. R. Randell.....	2.50	2,570
Oct. 7do.....	1.98	1,730

Daily gage height, in feet, of Bighorn River at Thermopolis, Wyo., for 1912.

[S. Nelson, observer.]

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
1.....		0.8	1.1	4.5	7.0	3.8	2.25	1.7
2.....		1.55	1.1	5.0	6.9	4.2	2.15	1.6
3.....		1.7	1.15	5.5	6.3	4.5	2.05	1.7
4.....		2.3	1.2	6.5	5.8	4.6	1.9	1.65
5.....		2.8	1.2	7.3	5.0	4.4	1.8	1.7
6.....		2.9	1.2	7.6	4.6	3.8	1.7
7.....		2.8	1.25	7.9	4.3	3.5	1.65	2.0
8.....		2.1	1.3	8.4	4.1	3.1	1.55
9.....		1.9	1.35	9.3	4.1	3.0	1.55
10.....		1.7	1.5	10.0	4.0	2.9	1.85

Daily gage height, in feet, of Bighorn River at Thermopolis, Wyo., for 1912—Continued.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
11.....	0.6	1.5	1.6	10.3	3.9	2.7	2.05
12.....	.55	1.6	1.7	9.8	3.7	2.6	2.0
13.....	.6	1.5	1.85	8.3	3.7	2.5	1.85
14.....	.6	1.4	1.75	8.0	3.7	2.4	1.8
15.....	.7	1.3	1.55	7.8	3.8	2.3	1.9
16.....	.7	1.3	1.5	6.0	3.9	2.25	2.0
17.....	.6	1.2	1.5	5.4	4.0	2.4	2.05
18.....	.65	1.0	1.65	4.6	3.9	2.5	1.95
19.....	.7	1.0	2.1	4.3	3.7	2.6	1.95
20.....	.7	1.1	2.5	4.1	3.9	2.6	1.9
21.....	.7	1.0	2.7	3.9	4.4	2.5	1.9
22.....	.8	1.0	3.0	4.4	4.4	2.4	1.8
23.....	.85	1.0	3.0	5.1	4.3	2.3	1.8
24.....	.8	1.0	2.7	6.0	4.1	2.25	2.2
25.....	.7	.9	2.6	7.0	3.8	2.05	2.25
26.....	.85	1.1	2.5	7.4	3.6	1.9	2.05
27.....	1.0	1.1	2.5	7.3	3.2	1.85	1.9
28.....	1.0	1.1	3.2	7.2	3.0	1.85	1.7
29.....	1.1	1.1	3.5	7.3	3.0	1.9	1.75
30.....	1.4	1.1	3.0	7.3	2.8	2.05	1.7
31.....	2.0	3.9	2.5	2.25

Daily discharge, in second-feet, of Bighorn River at Thermopolis, Wyo., for 1912.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
1.....	1,390	730	5,820	11,900	4,920	2,140	1,350
2.....	1,110	730	6,760	11,700	5,700	1,980	1,230
3.....	1,270	770	7,800	10,300	6,330	1,820	1,350
4.....	2,110	810	9,800	9,160	6,540	1,610	1,290
5.....	2,910	810	11,600	7,400	6,120	1,480	1,350
6.....	3,070	810	12,200	6,540	4,920	1,350	1,550
7.....	2,910	850	13,000	5,910	4,350	1,290	1,750
8.....	1,810	890	14,400	5,500	3,610	1,180
9.....	1,520	930	16,800	5,500	3,430	1,180
10.....	1,270	1,060	18,300	5,300	3,250	1,540
11.....	390	1,060	1,160	19,500	5,110	2,910	1,820
12.....	360	1,160	1,270	18,700	4,730	2,740	1,750
13.....	390	1,060	1,460	15,000	4,730	2,570	1,540
14.....	390	970	1,330	14,300	4,730	2,400	1,480
15.....	450	890	1,110	13,800	4,920	2,230	1,610
16.....	450	890	1,060	9,600	5,110	2,140	1,750
17.....	390	810	1,060	8,280	5,300	2,400	1,820
18.....	420	660	1,220	6,540	5,110	2,570	1,680
19.....	450	660	1,810	5,910	4,730	2,740	1,680
20.....	450	730	2,430	5,500	5,110	2,740	1,610
21.....	450	660	2,750	5,110	6,120	2,570	1,610
22.....	520	660	3,230	6,120	6,120	2,400	1,480
23.....	555	660	3,230	7,620	5,910	2,230	1,480
24.....	520	660	2,750	9,600	5,500	2,140	2,060
25.....	450	590	2,590	11,900	4,920	1,820	2,140
26.....	555	730	2,430	12,900	4,540	1,610	1,820
27.....	660	730	2,430	12,600	3,790	1,540	1,610
28.....	660	730	3,550	12,400	3,430	1,540	1,350
29.....	730	730	4,050	12,600	3,430	1,610	1,420
30.....	970	730	3,230	12,600	3,080	1,820	1,350
31.....	1,660	4,730	2,570	2,140

NOTE.—Daily discharge determined as follows: Mar. 11 to May 31, from a poorly defined rating curve; June 1-11 by shifting channel methods; June 12 to Oct. 7 from a fairly well-defined rating curve. Oct. 6 discharge interpolated.

Monthly discharge of Bighorn River at Thermopolis, Wyo., for 1912.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accu- racy.
	Maximum.	Minimum.	Mean.		
March 11-31.....	1,660	360	565	23,500	C.
April.....	3,070	590	1,170	69,600	C.
May.....	4,730	730	1,850	114,000	C.
June.....	19,500	5,110	11,200	666,000	C.
July.....	11,900	2,570	5,750	354,000	B.
August.....	6,540	1,540	3,100	191,000	B.
September.....	2,140	1,180	1,620	96,400	B.
October 1-7.....	1,750	1,230	1,410	19,600	B.
The period.....				1,530,000	

BIGHORN RIVER NEAR HARDIN, MONT.

Location.—In the SW. $\frac{1}{4}$ sec. 13, T. 1 S., R. 33 E., at the bridge of the Chicago, Burlington & Quincy Railroad, about half a mile above the junction of Bighorn and Little Bighorn rivers, 2 miles from Hardin, Mont.

Records available.—June 16, 1904, to December 31, 1912.

Drainage area.—20,700 square miles.

Gage.—A chain attached to west span of railroad bridge; datum unchanged since August 10, 1905.

Channel.—Composed of gravel; free from vegetation.

Discharge measurements.—Made from railroad bridge.

Winter flow.—Affected by ice.

Diversions and storage.—Water is diverted a few miles above the station by a private irrigation company to irrigate land on the west side of the river. Large quantities of water are diverted from the principal tributaries. The flow of Shoshone River is controlled by Shoshone Reservoir, the capacity of which is 456,000 acre-feet.

Accuracy.—Results good.

Discharge measurements of Bighorn River near Hardin, Mont., in 1912.

Date.	Hydrographer.	Gage height.	Dis- charge.
Apr. 10	W. A. Lamb.....	<i>Feet.</i> 3.95	<i>Sec.-ft.</i> 4,500
May 23do.....	5.38	10,200
Oct. 16	R. R. Randall.....	4.26	5,340

Daily gage height, in feet, of Bighorn River at Hardin, Mont., for 1912.

[H. R. Kean, observer.]

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1.....	4.2	2.9	5.2	6.8	4.3	3.75	4.0	4.2
2.....	4.2	2.9	5.5	7.5	4.4	3.95	4.1	4.1
3.....	4.4	2.9	5.8	7.7	4.9	3.95	4.0	4.1
4.....	4.2	2.95	6.5	7.0	5.5	4.0	4.0	4.1
5.....	4.2	3.5	6.8	7.2	5.8	4.0	4.3	4.1
6.....	4.2	3.8	7.0	6.6	5.6	3.95	4.3	4.0
7.....	4.4	3.6	6.8	6.3	5.2	3.85	4.8	4.0
8.....	4.3	3.4	6.9	6.5	5.1	3.85	4.8	3.95
9.....	4.2	3.4	7.2	5.8	4.9	3.75	4.5	3.95
10.....	3.95	3.35	7.6	5.7	4.7	3.8	4.5	3.95

Daily gage height, in feet, of Bighorn River at Hardin, Mont., for 1912—Continued.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
11.....	3.8	3.6	7.8	5.5	4.6	3.85	4.6	4.0
12.....	3.7	3.7	7.8	5.4	4.4	4.8	4.3
13.....	3.6	3.7	7.8	5.3	4.5	4.2	4.3
14.....	3.7	3.75	8.3	5.2	4.3	4.3	4.4
15.....	3.5	3.8	8.4	5.1	4.3	4.3	4.3
16.....	3.3	3.7	7.8	5.1	4.3	4.4	4.3
17.....	3.3	3.75	7.2	5.1	4.1	4.4	4.2
18.....	3.25	3.8	6.6	5.1	4.2	4.4	4.2
19.....	3.1	4.6	6.3	5.1	4.7	4.3	4.1
20.....	3.0	4.8	6.1	5.2	4.8	4.5	4.1
21.....	3.6	5.2	5.6	5.6	4.5	4.3	4.1
22.....	3.3	5.4	5.5	5.5	4.3	4.3	4.1
23.....	3.1	5.2	5.7	5.5	4.4	4.3	4.1
24.....	2.95	5.2	6.0	5.4	4.2	4.4	4.0
25.....	2.95	5.0	6.0	5.3	4.2	4.1	4.0
26.....	3.0	4.8	6.5	5.1	4.1	4.2	4.0
27.....	3.0	5.0	6.6	5.0	4.0	4.3	3.95
28.....	2.95	5.2	6.5	4.9	3.95	4.4	4.1
29.....	2.9	5.0	6.7	4.6	3.85	4.2	4.1
30.....	2.9	4.9	6.6	4.6	3.85	4.1	4.2
31.....	5.0	4.5	3.75	4.3

Daily discharge, in second-feet, of Bighorn River at Hardin, Mont., for 1912.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1.....	5,200	1,900	9,300	18,400	5,500	3,850	4,600	5,200
2.....	5,200	1,900	10,800	23,100	5,850	4,450	4,900	4,900
3.....	5,850	1,900	12,400	24,500	7,850	4,450	4,600	4,900
4.....	5,200	2,000	16,500	19,600	10,800	4,600	4,600	4,900
5.....	5,200	3,200	18,400	21,000	12,400	4,600	5,500	4,900
6.....	5,200	4,000	19,600	17,100	11,400	4,450	5,500	4,600
7.....	5,850	3,450	18,400	15,300	9,300	4,150	7,400	4,600
8.....	5,500	2,950	19,000	16,500	8,800	4,150	7,400	4,450
9.....	5,200	2,950	21,000	12,400	7,850	3,850	6,200	4,450
10.....	4,450	2,820	23,800	11,900	7,000	4,000	6,200	4,450
11.....	4,000	3,450	25,200	10,800	6,600	4,150	6,600	4,600
12.....	3,700	3,700	25,200	10,300	5,850	7,400	5,500
13.....	3,450	3,700	25,200	9,800	6,200	5,200	5,500
14.....	3,700	3,850	28,800	9,300	5,500	5,500	5,850
15.....	3,200	4,000	29,500	8,800	5,500	5,500	5,500
16.....	2,700	3,700	25,200	8,800	5,500	5,850	5,500
17.....	2,700	3,850	21,000	8,800	4,900	5,850	5,200
18.....	2,600	4,000	17,100	8,800	5,200	5,850	5,200
19.....	2,300	6,600	15,300	8,800	7,000	5,500	4,900
20.....	2,100	7,400	14,100	9,300	7,400	6,200	4,900
21.....	3,450	9,300	11,400	11,400	6,200	5,500	4,900
22.....	2,700	10,300	10,800	10,800	5,500	5,500	4,900
23.....	2,300	9,300	11,900	10,800	5,850	5,500	4,900
24.....	2,000	9,300	13,600	10,300	5,200	5,850	4,600
25.....	2,000	8,300	13,600	9,800	5,200	4,900	4,600
26.....	2,100	7,400	16,500	8,800	4,900	5,200	4,600
27.....	2,100	8,300	17,100	8,300	4,600	5,500	4,450
28.....	2,000	9,300	16,500	7,850	4,450	5,850	4,900
29.....	1,900	8,300	17,700	6,600	4,150	5,200	4,900
30.....	1,900	7,850	17,100	6,600	4,150	4,900	5,200
31.....	8,300	6,200	3,850	5,500

NOTE.—Daily discharge determined from a rating curve well defined between 3,000 and 12,000 second-feet and fairly well defined at other stages.

Monthly discharge of Bighorn River at Hardin, Mont., for 1912.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accu- racy.
	Maximum.	Minimum.	Mean.		
April.....	5,850	1,900	3,520	209,000	B.
May.....	10,300	1,900	5,400	332,000	A.
June.....	29,500	9,300	18,100	1,080,000	B.
July.....	24,500	6,200	12,000	738,000	B.
August.....	12,400	3,850	6,470	398,000	A.
September.....	7,400	3,850	5,120	305,000	A.
October.....	7,400	4,450	5,320	327,000	A.
November 1-11.....	5,200	4,450	4,720	103,000	A.
The period.....				3,490,000	

WARM SPRING CREEK NEAR DUBOIS, WYO.

Location.—In sec. 32, T. 42 N., R. 107 W., 150 feet above Wind River, about 6 miles above Dubois. The nearest tributary is a small stream entering from the south half a mile above.

Records available.—Fragmentary gage heights May 9, 1911, to June 28, 1912.

Drainage area.—Not measured.

Gage.—Vertical staff.

Channel.—Data too meager to determine.

Discharge measurements.—Made from footbridge at the station.

Winter flow.—Springs keep the creek open during the winter months.

Diversions.—Prior to July 1, 1912, there were adjudicated diversions of 0.6 second-foot from Warm Springs Creek.

Accuracy.—Data insufficient for estimates of discharge.

Cooperation.—Station maintained in cooperation with the United States Forest Service.

Daily gage height, in feet, of Warm Spring Creek near Dubois, Wyo., for 1912.

[Wilber Goodson, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	Day.	Jan.	Feb.	Mar.	Apr.	May.	June.
1.....							16.....			0.11			
2.....							17.....						2.5
3.....	0.16						18.....			.12		0.45	
4.....						2.5	19.....						
5.....							20.....		0.10				
6.....	.12		0.10		0.12		21.....						3.0
7.....							22.....		.10	0.12	.80		
8.....						3.5	23.....	0.10					
9.....	.10						24.....						
10.....		0.12		0.10			25.....				.90		2.0
11.....							26.....			.10			
12.....					.30		27.....		.10				
13.....		.10				3.0	28.....				1.10		1.5
14.....							29.....						
15.....	.10			.12			30.....	.10			.12		
							31.....						

HORSE CREEK AT DUBOIS, WYO.

Location.—At Dubois, in sec. 7, T. 41 N., R. 106 W., 100 yards above the mouth and $1\frac{1}{2}$ miles below the entrance of Piney Creek.

Records available.—August 4, 1910, to June 30, 1912.

Drainage area.—Not measured.

Gage.—Vertical staff.

Channel.—Data too meager to determine.

Discharge measurements.—Made from bridge at the station during high water and by wading at ordinary stages.

Winter flow.—Ice causes backwater during the winter months and records are discontinued.

Diversions.—Prior to July 1, 1912, there were adjudicated diversions of 14 second-feet from Horse Creek above the station.

Accuracy.—Owing to a lack of high-water measurements no estimates of discharge have been made.

Cooperation.—Station maintained in cooperation with the United States Forest Service.

Daily gage height, in feet, of Horse Creek at Dubois, Wyo., for 1912.

[G. H. Gleitsmann, observer.]

Day.	Apr.	May.	June.	Day.	Apr.	May.	June.	Day.	Apr.	May.	June.
1.....		9.0	10.22	11.....	9.0	9.4	10.65	21.....	8.88	10.05	10.7
2.....		8.92	10.5	12.....	9.0	9.2	10.58	22.....	8.9	9.85	10.95
3.....		8.92	10.8	13.....	9.0	9.12	10.7	23.....	8.78	9.62	11.3
4.....		8.9	10.72	14.....	8.92	9.28	10.6	24.....	8.95	9.5	11.35
5.....		8.9	10.82	15.....	8.92	9.25	10.2	25.....	8.95	9.8	11.4
6.....		8.88	10.85	16.....	8.95	9.5	9.9	26.....	9.0	9.85	11.25
7.....		9.0	11.35	17.....	8.95	9.7	9.65	27.....	8.92	9.68	11.45
8.....	9.1	9.15	11.7	18.....	8.95	9.9	9.65	28.....	9.0	9.62	11.25
9.....	9.1	9.28	11.42	19.....	8.95	10.0	9.7	29.....	8.98	9.75	11.15
10.....	9.18	9.55	11.5	20.....	8.85	10.18	10.45	30.....	9.0	10.3	11.15
								31.....		10.28	

LITTLE WIND RIVER ABOVE ARAPAHOE, WYO.

Location.—At railroad bridge in sec. 23, T. 1 S., R. 3 E., opposite the Indian sub-agency, one-fourth mile above Arapahoe and one-fourth mile above the mouth of Popo Agie River.

Records available.—May 14, 1911, to October 31, 1912. From May 11, 1906, to December 17, 1909, a station was maintained a short distance above the present one. The flow at the two points is comparable.

Drainage area.—Not measured.

Gage.—Chain gage reading approximately 1.6 feet higher than the gage at the former station.

Channel.—Somewhat shifting after high water.

Discharge measurements.—Made from railroad bridge.

Winter flow.—Ice causes backwater during the winter months and discharge measurements are made to determine the approximate flow.

Diversions.—Prior to July 1, 1912, there was an adjudicated diversion of 4.3 second-feet from Little Wind River.

Accuracy.—Although the channel shifted somewhat after the high water of 1912, sufficient discharge measurements have been made to make the estimates reliable.

Discharge measurements of Little Wind River above Arapahoe, Wyo., for 1912.

Date.	Hydrographer.	Gage height.	Dis-charge.	Date.	Hydrographer.	Gage height.	Dis-charge.
		<i>Feet.</i>	<i>Sec.-ft.</i>			<i>Feet.</i>	<i>Sec.-ft.</i>
Feb. 8	R. H. Fletcher ^a	4.00	57.2	July 24	R. H. Fletcher.....	3.85	625
Mar. 10do. ^b	4.00	46.9	Aug. 29do.....	2.95	253
May 26do.....	3.75	669	Oct. 26do.....	2.70	138
June 27do.....	4.85	1,550				

^a Measurements made under ice cover at a section on rifle several hundred feet below regular station at railway bridge. Relation of gage height to discharge affected.

^b Ice present.

Daily gage height, in feet, of Little Wind River above Arapahoe, Wyo., for 1912.

[J. E. Plummer, observer.]

Day.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
1.....				2.1	4.45	4.5	4.0	2.9	2.84
2.....				2.1	4.5	4.65	4.1	2.8	2.8
3.....		6.1		2.4	4.8	4.5	4.1		2.82
4.....				2.32	5.0	4.35	4.1	2.6	2.86
5.....				2.38	5.0	4.25	3.9	2.52	2.92
6.....				2.58	5.1	4.05	3.65	2.52	3.29
7.....			3.0	2.52	5.2	4.1	3.5	2.5	3.2
8.....	4.0		2.65	2.4	5.5	4.1	3.5	2.5	3.12
9.....			2.7	2.35	5.8	4.05	3.38	2.6	3.05
10.....		4.0	2.42	2.44	5.7	4.0	3.22	2.8	3.2
11.....			2.4	2.6	5.4	3.9	3.15	2.84	3.31
12.....			2.35	2.55	5.1	3.9	3.06	2.84	3.15
13.....			2.3	2.48	4.95	4.0	2.95	2.86	3.16
14.....			2.28		5.1	4.05	2.9	2.98	3.08
15.....			2.22	2.35	4.8	4.25	2.85	3.0	3.0
16.....			2.18	2.39	4.4	4.0	2.82	2.98	3.0
17.....			2.15	3.0	4.2	3.9	2.85	2.95	2.99
18.....	5.2		2.15	2.95	4.0	3.9	3.2	2.95	2.92
19.....			2.15	3.3	3.8	4.0	3.2	3.0	2.86
20.....			2.19	3.42	3.8	4.15	3.2	3.02	2.86
21.....			2.2	3.6	4.0	4.15	3.1	3.0	2.85
22.....			2.2	3.48	4.4	4.15	3.0	2.88	2.8
23.....			2.2	3.25	4.7	4.0	2.92	2.85	2.75
24.....			2.25	3.08	4.9	3.9	2.85	3.02	2.76
25.....	5.5		2.23	3.3		3.7	2.8	3.12	2.71
26.....			2.32	3.6	6.0	3.55	2.72	3.08	2.7
27.....			2.35	3.75	5.0	3.4	2.62	3.0	2.78
28.....			2.3	3.6	5.1	3.3	2.6	2.96	2.99
29.....			2.22	3.7	5.1	3.28	2.98	2.9	2.98
30.....			2.15	3.9	5.0	3.22	3.25	2.9	2.95
31.....				4.4		3.5	3.0		2.92

NOTE.—Relation of gage height to discharge during February and March affected by ice.

Daily discharge, in second-feet, of Little Wind River above Arapahoe, Wyo., for 1912.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
1.....		50	1,300	1,200	780	200	182
2.....		50	1,340	1,350	855	170	170
3.....		100	1,650	1,200	855	145	176
4.....		84	1,860	1,060	855	120	188
5.....		96	1,860	978	705	104	206
6.....		140	1,980	818	540	104	345
7.....	265	125	2,090	855	455	100	305
8.....	158	100	2,440	855	455	100	273
9.....	170	90	2,820	818	390	120	248
10.....	104	108	2,520	780	314	170	305
11.....	100	145	2,170	705	285	182	355
12.....	90	132	1,830	705	251	182	285
13.....	80	116	1,660	780	215	188	289
14.....	77	103	1,830	818	200	224	258
15.....	68	90	1,500	978	185	230	230
16.....	62	98	1,110	780	176	224	230
17.....	58	265	935	705	185	215	262
18.....	58	247	780	705	305	215	237
19.....	58	400	635	780	305	230	188
20.....	64	467	635	895	305	237	188
21.....	65	580	780	895	265	230	215
22.....	65	503	1,110	895	230	194	200
23.....	65	375	1,400	780	206	185	185
24.....	72	297	1,610	705	185	237	188
25.....	70	400	2,240	570	170	273	173
26.....	84	580	2,880	482	150	258	170
27.....	90	688	1,720	400	125	230	194
28.....	80	580	1,830	350	120	218	262
29.....	68	650	1,830	341	224	200	258
30.....	58	805	1,720	314	328	200	248
31.....		1,250		455	230		237

NOTE.—Discharge determined from rating curve as follows: Apr. 7 to June 9, from a curve well defined below 3,000 second-feet. June 10 to Oct. 31, from a curve drawn parallel to standard curve and through three 1912 measurements. Mean discharge, February and March, estimated on basis of two discharge measurements and climatologic data.

Monthly discharge of Little Wind River above Arapahoe, Wyo., for 1912.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accu- racy.
	Maximum.	Minimum.	Mean.		
February.....			^a 50.0	2,880	D.
March.....			^a 50.0	3,070	D.
April 7—30.....	265	58	88.7	4,220	B.
May.....	1,250	50	313	19,200	A.
June.....	2,820	635	1,670	99,400	B.
July.....	1,350	314	773	47,500	B.
August.....	855	120	350	21,500	B.
September.....	273	100	190	11,300	B.
October.....	355	170	234	14,400	B.

^a Estimated.

LITTLE WIND RIVER BELOW ARAPAHOE, WYO.

Location.—At highway bridge in sec. 23, T. 1 S., R. 3 E., half a mile below Arapahoe.

Popo Agie River enters 200 yards above. Little Wind River enters Wind River 6 miles below, and between the station and the mouth Beaver Creek enters.

Records available.—May 11, 1906, to November 27, 1909; May 14, 1911, to October 31, 1912.

Drainage area.—Not measured.

Gage.—Vertical staff; datum unchanged since it was originally placed in 1906. From June 19 to July 19, 1911, a temporary gage was used whose datum was 2.95 feet higher. This was replaced on the latter date by a gage reading to the original datum. All readings are referred to the original datum.

Channel.—Shifting slightly from year to year.

Discharge measurements.—Made from highway bridge.

Winter flow.—The river is frozen over during the winter months and discharge measurements are made to determine the approximate flow.

Diversions.—Prior to July 1, 1912, there were adjudicated diversions of 4.3 second-feet from Little Wind River and diversions of 563 second-feet from the Popo Agie and its tributaries.

Accuracy.—Although there is a slight shift, frequent measurements have defined this, and the estimates should be reliable.

Discharge measurements of Little Wind River below Arapahoe, Wyo., in 1912.

Date.	Hydrographer.	Gage height.	Dis- charge.	Date.	Hydrographer.	Gage height.	Dis- charge.
		<i>Feet.</i>	<i>Sec.-ft.</i>			<i>Feet.</i>	<i>Sec.-ft.</i>
Feb. 8 ^a	R. H. Fletcher.....	2.28	130	July 24 ^b	R. H. Fletcher.....	3.35	1,250
Mar. 10 ^ado.....	2.30	130	Aug. 29 ^bdo.....	2.28	569
May 20 ^bdo.....	4.00	1,870	Oct. 26 ^bdo.....	2.05	425
June 27 ^bdo.....	5.90	4,020				

^a Measurement made under complete ice cover at regular section. Closed at control. Relation of gage height to discharge affected.

^b Discharge is sum of discharges of Little Wind River above Arapahoe and the Popo Agie River.

Daily gage height, in feet, of Little Wind River below Arapahoe, Wyo., for 1912.

[J. E. Plummer, observer.]

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
1.....			1.5	5.8	5.4	3.6	2.0	2.15
2.....			1.45	6.0	5.1	3.6	1.9	2.15
3.....			1.65	6.6	4.6	3.4	1.9	2.15
4.....			1.5	6.6	4.4	3.3	1.78	2.15
5.....			1.68	6.6	4.3	3.2	1.7	2.4
6.....			2.05	6.8	4.2	2.85	1.78	2.85
7.....		3.6	2.25	6.7	4.2	2.65	1.72	2.8
8.....		2.2	1.9	7.3	4.2	2.75	1.7	2.75
9.....		2.0	1.8	7.6	4.0	2.75	1.8	2.65
10.....	2.8	1.98	1.8	7.2	3.9	2.5	2.2	2.8
11.....		1.95	2.0	6.6	3.7	2.4	2.2	2.9
12.....		1.6	2.1	6.2	3.9	2.3	2.1	2.7
13.....		1.55	2.0	6.4	3.9	2.3	2.2	2.6
14.....		1.5		6.4	4.1	2.1	2.35	2.5
15.....		1.5	1.7	5.4	4.2	2.05	2.45	2.4
16.....		1.6	1.7	4.9		2.0	2.4	2.4
17.....	2.6	1.5	2.4	4.6	3.8	2.0	2.3	2.35
18.....		1.4	2.5	4.2	3.7	2.4	2.3	2.3
19.....		1.5	2.85	4.0	3.7	2.4	2.4	2.3
20.....		1.4	3.0	4.1	4.2	2.4	2.5	2.3
21.....		1.4	3.4	4.5	4.0	2.3	2.35	2.2
22.....		1.4	3.4	5.4	3.9	2.15	2.25	2.2
23.....		1.5	3.0	5.6	3.8	1.95	2.2	2.1
24.....		1.48	2.9	6.2	6.4	1.9	2.5	2.05
25.....		1.4	3.3		3.1	1.8	2.55	1.92
26.....		1.6	3.8	6.0		1.72	2.45	1.9
27.....		1.65	4.1	6.0	2.7	1.72	2.35	2.15
28.....		1.5	4.0	6.4	2.6	1.88	2.3	2.5
29.....		1.5	4.1	6.0	2.5	2.3	2.25	2.4
30.....		1.5	5.0	5.8	2.4	2.3	2.2	2.4
31.....	3.5		5.8		3.0	2.2		2.3

NOTE.—Gage heights during March distorted by ice.

Daily discharge, in second-feet, of Little Wind River below Arapahoe, Wyo., for 1912.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
1.....		210	3,820	3,320	1,480	414	490	16...	243	280	2,740	1,850	414	626	626
2.....		196	4,100	2,960	1,480	366	490	17...	210	626	2,440	1,660	414	570	598
3.....		262	5,020	2,440	1,300	366	490	18...	181	684	2,040	1,570	626	570	570
4.....		210	5,020	2,240	1,220	313	490	19...	210	902	1,850	1,570	626	626	570
5.....		273	5,020	2,140	1,150	280	626	20...	181	1,000	1,940	2,040	626	684	570
6.....		439	5,360	2,040	902	313	902	21...	181	1,300	2,340	1,850	570	798	516
7.....	1,480	543	5,180	2,040	775	288	870	22...	181	1,300	3,320	1,760	490	543	516
8.....	516	366	6,240	2,040	838	280	838	23...	210	1,000	3,560	1,680	390	516	464
9.....	414	321	6,780	1,850	838	321	775	24...	204	935	4,400	1,300	366	684	439
10.....	404	321	6,060	1,760	684	516	870	25...	181	1,220	4,240	1,080	321	714	376
11.....	390	414	5,020	1,570	626	516	935	26...	243	1,660	4,100	943	288	655	366
12.....	243	464	4,400	1,760	570	464	806	27...	262	1,940	4,100	806	288	798	490
13.....	226	414	4,700	1,760	570	516	744	28...	210	1,850	4,700	744	357	570	684
14.....	210	347	4,700	1,940	464	798	684	29...	210	1,940	4,100	684	570	543	626
15.....	210	280	3,320	2,040	439	655	626	30...	210	2,860	3,820	626	570	516	626
								31.....		3,820		1,000	516		570

NOTE.—Discharge determined from a fairly well-defined curve. Discharge interpolated for days on which gage was not read.

Monthly discharge of Little Wind River below Arapahoe, Wyo., for 1912.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accu- racy.
	Maximum.	Minimum.	Mean.		
February.....			a 130	7,480	D.
March.....			a 140	8,610	D.
April 7-30.....	1,480	181	300	14,300	B.
May.....	3,820	196	915	56,300	B.
June.....	6,780	1,850	4,140	246,000	B.
July.....	3,320	626	1,710	105,000	B.
August.....	1,480	288	670	41,200	B.
September.....	798	280	527	31,400	B.
October.....	902	366	621	38,200	B.

a Estimated from two discharge measurements and climatologic data.

POPO AGIE RIVER NEAR LANDER, WYO.

Location.—On the Middle Fork in the Yellowstone National Forest, at the ranger station in sec. 24, T. 32 N., R. 101 W., about 6 miles southwest of Lander. The nearest tributary enters several miles below.

Records available.—April 1, 1911, to June 30, 1912.

Drainage area.—Not measured.

Gage.—Staff gage used until June 17, 1911, when it was washed out by high water.

A new staff gage was installed reading 7.86 higher than the original gage.

All readings have been referred to the latter gage.

Channel.—Apparently permanent.

Discharge measurements.—Made by wading.

Winter flow.—Ice causes backwater during the winter months and the observations are discontinued.

Diversions.—Appropriations amounting to 164 second-feet have been adjudicated from the Middle Fork prior to July 1, 1912. Very nearly all of this water is diverted below the station.

Accuracy.—Conditions are favorable for accurate results except that the discharge above 300 second-feet may be somewhat in error, owing to a lack of high-water measurements. Results for 1912 are somewhat uncertain, as no discharge measurements were made during 1912.

Cooperation.—Station maintained in cooperation with the United States Forest Service.

Daily discharge, in second-feet, of Popo Agie River near Lander, Wyo., for 1911.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1.....	14	46	378	351	137	30	86	20
2.....	16	46	393	347	122	32	77	26
3.....	16	43	408	343	106	32	106	17
4.....	14	226	483	339	106	35	53	17
5.....	13	188	528	334	96	35	96	14
6.....	12	128	513	320	128	60	86	14
7.....	12	140	588	334	117	46	60	14
8.....	11	252	490	332	102	40	60	14
9.....	12	239	420	330	102	40	60	12
10.....	12	279	378	328	96	30	53
11.....	13	279	498	226	96	30	49
12.....	12	239	618	239	96	30	44
13.....	11	226	618	252	86	30	40
14.....	10	213	618	226	82	30	46
15.....	10	226	663	252	82	29	30

Daily discharge, in second-feet, of Popo Agie River near Lander, Wyo., for 1911—Contd.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
16.....	10	423	708	252	86	30	32
17.....	11	239	648	239	80	25	32
18.....	11	213	483	252	72	20	30
19.....	12	140	573	235	68	20	30
20.....	13	146	573	218	68	22	30
21.....	13	152	693	201	68	23	29
22.....	12	182	640	213	68	20	23
23.....	16	213	588	188	65	20	23
24.....	21	226	498	188	60	20	23
25.....	26	293	393	181	55	21	23
26.....	43	293	363	176	50	22	23
27.....	68	252	348	181	45	35	23
28.....	77	239	393	176	40	60	24
29.....	77	226	363	170	35	53	24
30.....	62	239	359	164	30	46	24
31.....		306	152	30	20

Daily gage height, in feet, and discharge, in second-feet, of Popo Agie River near Lander, Wyo., for 1912.

[Chas. J. Boyer, observer.]

Day.	April.		May.		June.		Day.	April.		May.		June.	
	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.		Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
1.....	8.50	12	11.0	573	16.....	8.45	10	9.02	56	10.1	306
2.....	8.45	10	11.1	603	17.....	8.45	10	9.25	96	9.9	252
3.....	8.48	11	11.2	633	18.....	8.36	7.5	9.50	152	9.9	252
4.....	8.45	10	11.2	633	19.....	8.35	7.0	9.55	164	9.9	252
5.....	11	11.25	633	20.....	8.30	5.0	9.7	201	10.1	306
6.....	8.50	12	11.2	633	21.....	8.50	12	9.6	176	10.4	393
7.....	8.52	13	11.1	603	22.....	8.45	10	9.5	152	10.6	455
8.....	8.68	21	11.4	693	23.....	8.45	10	9.5	152	10.9	540
9.....	8.80	30	11.3	663	24.....	8.48	11	9.6	176	10.8	513
10.....	8.90	40	10.7	483	25.....	8.48	11	9.7	201	10.85	513
11.....	8.80	30	10.4	393	26.....	8.50	12	10.2	334	10.9	540
12.....	8.75	26	10.5	423	27.....	8.45	10	10.0	279	10.8	513
13.....	8.70	23	10.8	513	28.....	8.55	14	10.05	293	10.8	513
14.....	8.60	17	10.4	393	29.....	8.52	13	10.2	334	10.8	513
15.....	8.82	32	10.15	320	30.....	8.50	12	10.7	483	10.5	423
							31.....	10.8	513

NOTE.—(1911-12) Discharge interpolated for days for which gage heights are missing. Daily discharge determined from a rating curve based on four 1911 measurements and well defined below 250 second-feet.

Monthly discharge of Popo Agie River near Lander, Wyo., for 1911-12.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accu- racy.
	Maximum.	Minimum.	Mean.		
1911.					
April.....	77	10	22	1,310	B.
May.....	423	43	211	13,000	B.
June.....	708	348	507	30,200	C.
July.....	351	152	250	15,400	B.
August.....	137	30	79.8	4,910	B.
September.....	60	20	32.2	1,920	B.
October.....	106	20	43.8	2,690	B.
November 1-9.....	26	12	16.4	292	B.
The period.....				69,700	
1912.					
April 16-30.....	14	5.0	10.3	306	B.
May.....	513	10	131	8,060	B.
June.....	693	252	483	28,700	C.

LITTLE POPO AGIE RIVER AT HUDSON, WYO.

Location.—A short distance below the highway bridge, three-eighths of a mile southwest of Hudson. No tributary between the station and the mouth of the river.

Records available.—August 26, 1907, to December 31, 1909; June 19, 1911, to October 31, 1912.

Drainage area: Approximately 360 square miles.

Gage.—Chain gage. The original gage was located at the highway bridge. On June 13, 1908, a chain gage was installed at the present location at a somewhat different datum, but set to read the same as the original gage for the stage at which it was installed.

Channel.—Practically permanent.

Discharge measurements.—Made from the highway bridge during high water and by wading during low stages.

Winter flow.—Ice causes backwater during the winter months, and the records are discontinued.

Diversions.—Prior to July 1, 1912, adjudicated diversions from Little Popo Agie above the station amounted to 49 second-feet and from the tributaries 20 second-feet.

Accuracy.—Conditions are favorable for accurate results and the estimates are considered reliable.

Discharge measurements of Little Popo Agie River at Hudson, Wyo., for 1912.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
May 27	R. H. Fletcher.....	<i>Fect.</i> 3.71	<i>Sec.-ft.</i> 314	Aug. 29	R. H. Fletcher.....	<i>Fect.</i> 2.50	<i>Sec.-ft.</i> 65.1
June 27do.....	4.50	541	Oct. 26do.....	2.50	66.3
July 24do.....	2.80	133				

Daily gage height, in feet, of Little Popo Agie River at Hudson, Wyo., for 1912.

[Alice Ladd, observer.]

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
1....		2.35	5.2	5.5	3.2	2.45	2.5	16....	2.1	2.55	4.0	4.4	2.4	2.7	2.6
2....		2.3	5.2	5.1	2.7	2.45	2.5	17....	2.05	2.7	4.3	4.2	2.45	2.6	2.6
3....		2.5	5.4	5.0	2.6	2.3	2.5	18....	2.1	2.95	3.8	4.1	2.5	2.6	2.6
4....		2.4	5.8	4.8	2.6	2.3	2.5	19....	2.1	3.2	3.8	4.1	2.6	2.6	2.55
5....	5.3	2.45	5.8	4.8	2.5	2.4	2.65	20....	2.1	3.25	3.7	4.4	2.55	2.7	2.55
6....		2.8	5.6	4.7	2.5	2.3	3.0	21....	2.15	3.45	3.8	4.2	2.5	2.6	2.6
7....	2.6	3.2	5.6	4.6	2.45	2.3	2.85	22....	2.2	3.4	4.0	4.1	2.5	2.5	2.55
8....	2.5	2.85	6.0	4.6	2.55	2.3	2.8	23....	2.2	3.25	4.4	4.0	2.48	2.5	2.55
9....	2.45	2.7	6.1	4.5	2.6	2.42	2.8	24....	2.2	3.3	4.6	3.4	2.38	2.7	2.5
10....	2.45	2.75	5.9	4.5	2.5	2.65	2.9	25....	2.3	3.5	4.6	2.7	2.3	2.65	2.5
11....	2.35	2.8	6.0	4.4	2.5	2.7	2.32	26....	2.4	3.7	4.4	2.6	2.28	2.6	2.5
12....	2.35	2.9	4.9	4.4	2.5	2.6	2.85	27....	2.35	3.9	4.6	2.55	2.22	2.55	2.6
13....	2.25	2.85	5.0	4.3	2.48	2.6	2.75	28....	2.3	3.8	4.6	2.5	2.32	2.5	2.95
14....	2.1	2.65	5.0	4.3	2.4	2.7	2.75	29....	2.25	3.9	4.5	2.42	2.45	2.5	2.75
15....	2.05	2.6	4.4	4.4	2.35	2.8	2.6	30....	2.3	4.3	4.4	2.38	2.45	2.5	2.8
								31....	5.0	2.5	2.45	2.8

NOTE.—Relation of gage height to discharge Apr. 5 affected by ice.

Daily discharge, in second-feet, of Little Popo Agie River at Hudson, Wyo., for 1911.

Day.	June.	July.	Aug.	Sept.	Oct.	Nov.	Day.	June.	July.	Aug.	Sept.	Oct.	Nov.
1.....		280	28	18	25	43	16.....		66	21	18	30
2.....		231	26	17	29	47	17.....		66	21	18	35
3.....		195	25	16	30	47	18.....		66	21	16	36
4.....		185	25	16	30	47	19.....	565	174	21	17	36
5.....		185	24	20	23	47	20.....	576	118	20	18	35
6.....		185	26	22	34	44	21.....	671	86	20	18	35
7.....		168	28	23	34	41	22.....	748	79	20	18	35
8.....		164	30	25	30	43	23.....	550	69	20	18	47
9.....		143	23	25	34	44	24.....	466	66	20	18	44
10.....		122	25	24	34	44	25.....	394	56	20	18	44
11.....		92	26	20	34	44	26.....	311	47	20	19	44
12.....		79	26	20	31	27.....	280	45	20	21	47
13.....		69	25	18	36	28.....	280	43	20	23	43
14.....		66	25	18	34	29.....	273	39	20	28	43
15.....		66	25	18	34	30.....	269	34	20	25	47
							31.....		29	20	44

Daily discharge in second-feet, of Little Popo Agie River at Hudson, Wyo., for 1912.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
1....	80	50	638	704	206	60	66	16....	30	74	374	462	54	102	82
2....	80	45	638	616	102	60	66	17....	28	102	440	418	60	82	82
3....	80	66	682	594	82	45	66	18....	30	154	332	396	66	82	82
4....	80	54	770	550	82	45	66	19....	30	206	332	396	82	82	74
5....	80	60	770	550	66	54	92	20....	30	216	311	462	74	102	74
6....	80	122	726	528	66	45	164	21....	34	258	332	418	66	82	82
7....	82	206	726	506	60	45	132	22....	37	248	374	396	66	66	74
8....	66	132	814	506	74	45	122	23....	37	216	462	374	64	66	74
9....	60	102	836	484	82	56	122	24....	37	227	506	248	52	102	66
10....	60	112	792	484	66	92	143	25....	45	269	506	102	45	92	66
11....	50	122	814	462	66	102	47	26....	54	311	462	82	43	82	66
12....	50	143	572	462	66	82	132	27....	50	353	506	74	39	74	82
13....	41	132	594	440	64	82	112	28....	45	332	506	66	47	66	154
14....	30	92	594	440	54	102	112	29....	41	353	484	59	60	66	112
15....	28	82	462	462	50	122	82	30....	45	440	462	52	60	66	122
								31....		594	66	60	122

NOTE.—Discharge 1911-12 determined from a well-defined rating curve. Discharge Apr. 1-6, 1912, estimated at 80 second-feet.

Monthly discharge of Little Popo Agie River at Hudson, Wyo., for 1911-12.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accu- racy.
	Maximum.	Minimum.	Mean.		
1911.					
June 19-30.....	748	269	449	10,700	B.
July.....	280	29	107	6,580	B.
August.....	30	20	23.1	1,420	B.
September.....	28	16	19.8	1,180	B.
October.....	47	25	36.2	2,230	B.
November 1-11.....	47	41	44.6	972	B.
The period.....				23,100	
1912.					
April.....	80	28	50.6	3,010	B.
May.....	594	45	189	11,600	B.
June.....	836	311	561	33,400	C.
July.....	704	52	383	23,600	C.
August.....	206	39	68.5	4,210	B.
September.....	122	45	74.9	4,460	B.
October.....	164	66	94.8	5,830	B.
The period.....				86,100	

OWL CREEK NEAR THERMOPOLIS, WYO.

Location.—At a highway bridge about 5 miles northwest of Thermopolis, Wyo., near the ranch buildings of the observer, C. H. McCumber.

Records available.—July 30, 1910, to October 31, 1912.

Drainage area.—Not measured.

Gage.—A standard chain, fastened to the floor of the bridge on the upstream side.

Previous to August 1, 1911, a staff gage was read. It was on the upstream side of the bridge and set to the same datum as the chain gage.

Channel.—Shifting.

Discharge measurements.—Made by wading.

Winter flow.—Affected by ice.

Diversions.—Water is diverted from Owl Creek for irrigation and practically all the low-water flow is appropriated.

Accuracy.—Results should be fair.

Discharge measurements of Owl Creek near Thermopolis, Wyo., in 1912.

Date.	Hydrographer.	Gage height.	Dis-charge.
		<i>Feet.</i>	<i>Sec.-ft.</i>
June 18	W. A. Lamb	2.00	16.8
Aug. 13	R. R. Randell	1.62	3.4
Oct. 7	do.	2.43	48.0

Daily gage height, in feet, of Owl Creek near Thermopolis, Wyo., for 1912.

[C. H. McCumber, observer.]

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
1		1.8	2.6	2.3	2.4	1.6	2.1	16		2.1	2.4	2.1	1.7	2.0	2.3
2		1.8	2.7	2.25	3.0	1.6	2.1	17		2.3	2.2	2.1	2.4	2.0	2.25
3		1.9	2.75	2.25	2.4	1.6	2.1	18		2.4	2.05	2.3	2.7	2.2	2.2
4		2.0	2.8	3.8	2.3	1.6	2.1	19		2.8	2.0	2.4	2.5	2.2	2.2
5		2.0	2.85	2.6	2.0	1.6	2.3	20		2.9	2.0	2.4	2.3	2.4	2.2
6		2.0	2.9	2.5	2.0	1.6	2.5	21		2.85	2.45	2.3	2.0	2.0	2.2
7		2.0	3.05	2.45	2.0	1.6	2.5	22		2.75	2.55	2.1	1.8	2.0	2.2
8		2.0	3.2	2.5	2.0	1.6	2.55	23		2.7	2.5	2.1	1.7	2.0	2.2
9		2.0	3.35	2.4	2.0	2.3	2.6	24		2.2	2.45	2.1	1.7	2.1	2.2
10		2.1	3.2	2.35	2.0	1.9	2.5	25		2.2	2.4	2.0	1.7	2.1	2.2
11		2.1	3.15	2.3	1.9	1.9	2.5	26		2.2	2.35	1.2	1.7	2.2	2.2
12		2.3	3.25	2.3	1.7	1.8	2.45	27		2.6	2.35	1.2	1.7	2.2	2.2
13		2.1	2.9	2.25	1.7	1.7	2.4	28	1.8	2.7	2.3	1.6	1.7	2.1	2.8
14		2.1	2.8	2.2	1.7	1.7	2.4	29	1.8	2.75	2.3	1.6	1.6	2.1	2.6
15		2.1	2.5	2.1	1.7	1.9	2.35	30	1.8	2.65	2.2	1.6	1.6	2.1	2.5
								31		2.6		2.3	1.6		2.55

Daily discharge, in second-feet, of Owl Creek near Thermopolis, Wyo., for 1912.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
1.....		8.7	65	35	45	3.7	22	16.....		22	45	22	5.7	17	35
2.....		8.7	78	32	127	3.7	22	17.....		35	28	22	45	17	32
3.....		12.5	86	32	45	3.7	22	18.....		45	20	35	78	28	28
4.....		17	93	315	35	3.7	22	19.....		93	17	45	55	28	28
5.....		17	102	65	17	3.7	35	20.....		110	17	45	35	45	28
6.....		17	110	55	17	3.7	55	21.....		102	50	35	17	17	28
7.....		17	136	50	17	3.7	55	22.....		86	60	22	8.7	17	28
8.....		17	168	55	17	3.7	60	23.....		78	55	22	5.7	17	28
9.....		17	201	45	17	35	65	24.....		28	50	22	5.7	22	28
10.....		22	168	40	17	12.5	55	25.....		28	45	17	5.7	22	28
11.....		22	157	35	12.5	12.5	55	26.....		28	40	.0	5.7	28	28
12.....		35	179	35	5.7	8.7	50	27.....		65	40	.0	5.7	28	28
13.....		22	110	32	5.7	5.7	45	28.....	8.7	78	35	3.7	5.7	22	93
14.....		22	93	28	5.7	5.7	45	29.....	8.7	86	35	3.7	3.7	22	65
15.....		22	55	22	5.7	12.5	40	30.....	8.7	72	28	3.7	3.7	22	55
								31.....		65		35	3.7		60

NOTE.—Daily discharge determined from a fairly-well defined rating curve.

Monthly discharge of Owl Creek near Thermopolis, Wyo., for 1912.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accu- racy.
	Maximum.	Minimum.	Mean.		
May.....	110	8.7	41.9	2,580	B.
June.....	201	17	78.9	4,690	B.
July.....	315	.0	39.0	2,400	B.
August.....	127	3.7	21.9	1,350	B.
September.....	45	3.7	15.8	940	B.
October.....	93	22	40.9	2,510	B.
The period.....				14,500	

NO WOOD RIVER AT BONANZA, WYO.

Location.—In the SW. $\frac{1}{4}$ SW. $\frac{1}{4}$ sec. 13, T. 49 N., R. 91 W., near the ranch of J. W.

Graves, one-fourth mile north of Bonanza post office.

Records available.—July 29, 1910, to October 31, 1912.

Drainage area.—Not measured.

Gage.—Overhanging chain gage on left bank near public highway.

Channel.—Sand and gravel.

Discharge measurements.—Made by wading 50 feet below the gage; in flood, from the public highway bridge one-half mile below.

Winter flow.—Affected by ice.

Diversions.—Irrigation is carried on to some extent and water is diverted both above and below the station.

Accuracy.—Results fair.

Discharge measurements of No Wood River at Bonanza, Wyo., in 1912.

Date.	Hydrographer.	Gage height.	Dis- charge.
		<i>Feet.</i>	<i>Sec.-ft.</i>
June 16	W. A. Lamb.....	4.89	1,410
Aug. 10	R. R. Randell.....	3.16	454
Oct. 3do.....	2.94	383

Daily gage height, in feet, and discharge, in second-feet, of No Wood River at Bonanza, Wyo., for 1912.

[Grace Taylor, observer.]

Day.	June.		July.		August.		September.		October.	
	Gage height.	Dis-charge.	Gage height.	Dis-charge.	Gage height.	Dis-charge.	Gage height.	Dis-charge.	Gage height.	Dis-charge.
1.....			5.5	1,780	2.6	250	2.5	215	2.98	397
2.....			8.3	3,460	2.8	325	2.5	215	2.90	365
3.....			5.0	1,480	2.55	232	2.5	215	2.95	385
4.....			4.4	1,120	3.75	765	2.45	198	3.0	405
5.....			4.5	1,180	3.70	740	2.5	215	3.0	405
6.....			4.4	1,120	2.18	120	2.5	215	3.3	540
7.....			4.4	1,120	2.18	120	2.5	215	3.25	518
8.....			4.0	900	3.45	615	2.5	215	3.1	450
9.....			3.9	845	3.4	590	2.6	250	3.05	428
10.....			3.8	790	3.5	640	2.8	325	3.0	405
11.....			3.6	690	3.0	405	3.4	590	3.2	495
12.....			3.5	640	3.0	405	3.2	495	3.0	405
13.....			3.7	740	2.7	285	3.3	540	3.0	405
14.....			3.8	790	2.8	325	3.2	495	2.95	385
15.....			3.9	845	2.7	285	3.0	405	2.9	365
16.....			3.6	690	2.7	285	3.1	450	2.95	385
17.....	4.4	1,120	3.5	640	2.65	268	3.05	428	2.9	365
18.....	4.4	1,120	3.6	690	3.2	495	3.0	405	2.9	365
19.....	4.4	1,120	3.6	690	3.4	590	3.05	428	2.85	345
20.....	4.4	1,120	3.5	640	3.3	540	3.05	428	2.8	325
21.....	4.9	1,420	3.8	790	3.25	518	3.1	450	2.8	325
22.....	5.1	1,540	3.5	640	3.2	495	3.0	405	2.8	325
23.....	5.8	1,960	3.4	590	2.8	325	2.9	365	2.8	325
24.....	5.5	1,780	3.15	472	2.65	268	3.0	405	2.8	325
25.....	5.4	1,720	3.1	450	2.4	180	2.95	385	2.8	325
26.....	5.3	1,660	2.9	365	2.6	250	3.05	428	2.8	325
27.....	5.3	1,660	2.8	325	2.45	198	3.0	405	2.8	325
28.....	5.4	1,720	2.7	285	2.5	215	3.05	428	2.85	345
29.....	5.2	1,600	2.65	268	2.5	215	2.9	365	2.85	345
30.....	5.5	1,780	2.55	232	2.45	198	2.9	365	2.9	365
31.....			2.6	250	2.5	215			2.9	365

NOTE.—daily discharge determined from a fairly well defined rating curve.

Monthly discharge of No Wood River at Bonanza, Wyo., for 1912.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accu- racy.
	Maximum.	Minimum.	Mean.		
June 17-30.....	1,960	1,120	1,520	42,200	B.
July.....	3,460	232	823	50,600	B.
August.....	765	120	366	22,500	B.
September.....	590	198	365	21,700	B.
October.....	540	325	382	23,500	B.
The period.....				160,000	

TENSLEEP CREEK NEAR TENSLEEP, WYO.

Location.—In NW. $\frac{1}{4}$ NW. $\frac{1}{4}$ sec. 12, T. 47 N., R. 88 W., 5 miles from Tensleep post office and 800 feet east of the county bridge, on Burke's ranch, near a cliff 80 feet high on north side of creek; just below mouth of Canyon Fork, the principal tributary.

Records available.—September 21, 1910, to December 31, 1912.

Drainage area.—Not measured.

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Gage.—Inclined and upright staff.

Channel.—Rocky ledge.

Discharge measurements.—At low and ordinary stages made by wading; at flood stages made from the bridges over Canyon Fork and Tensleep Creek.

Winter flow.—Ice will not form at this station except in extremely cold weather.

Diversions.—A small amount of water is diverted from this stream for irrigation, but none above the gage.

Accuracy.—Results fair.

Discharge measurements of Tensleep Creek near Tensleep, Wyo., in 1912.

Date.	Hydrographer.	Gage height.	Dis-charge.
June 15	W. A. Lamb	<i>Feet.</i> 2.35	<i>Sec.-ft.</i> 660
Aug. 11	R. R. Randell	.81	164
Oct. 4	do.	.61	121

Daily gage height, in feet, of Tensleep Creek near Tensleep, Wyo., for 1912.

[Bessie Burke, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	-.03	-.05	-.05	0.00	0.08	3.2	3.0	1.9	0.35	0.5	0.35	0.09
2	-.05	-.03	-.05	.01	.09	3.2	2.9	1.6	.35	.55	.3	.08
3	-.08	-.03	.1	.05	.08	4.1	2.9	2.1	.3	.55	.25	.06
4	-.05	-.05	.00	.1	.10	4.8	2.8	2.0	.25	.6	.3	.06
5	-.03	-.04	.00	.05	.08	4.1	2.5	1.25	.3	.55	.25	.07
6	-.03	-.05	-.03	.00	.07	4.4	2.6	1.4	.35	.6	.24	.05
7	-.02	-.04	-.05	.08	.08	4.3	2.7	1.0	.3	.65	.24	.06
8	.00	-.03	-.06	.09	.14	5.3	2.2	1.9	.25	.6	.25	.10
9	.01	-.05	-.05	.05	.17	4.4	1.8	1.9	.35	.6	.25	.09
10	.00	-.01	-.06	.03	.25	5.0	1.6	1.2	.8	.6	.25	.10
11	-.02	-.02	-.04	.00	.3	3.0	1.35	.8	.6	.65	.25	.12
12	.01	-.03	-.06	.05	.25	4.6	1.35	.85	.55	.65	.3	.09
13	.00	-.05	-.06	.03	.25	4.4	1.4	.75	.55	.5	.25	.07
14	.01	-.03	-.03	.01	.3	3.4	1.55	.7	.65	.55	.25	.08
15	.01	.00	.05	.06	.25	3.0	1.7	.65	.6	.5	.24	.09
16	.02	-.01	-.02	.04	.3	2.0	1.35	.6	.6	.45	.22	.08
17	.01	.01	-.05	.02	.4	1.9	1.35	.95	.65	.5	.21	.07
18	.00	-.01	-.05	.00	.7	1.8	1.35	1.45	.6	.45	.22	.07
19	-.06	-.03	-.07	.03	.9	1.65	1.45	1.25	.75	.45	.20	.05
20	-.05	-.01	-.05	.05	1.25	2.1	2.0	1.2	.7	.35	.21	.04
21	.00	-.02	-.03	.03	1.6	2.5	2.5	.8	.65	.4	.22	.03
22	.01	-.03	-.03	.01	1.8	2.7	1.8	.65	.6	.45	.21	.02
23	.01	-.01	.00	.00	1.8	2.8	1.35	.65	.6	.4	.20	.02
24	.00	-.04	-.05	.01	1.5	3.0	1.1	.7	.65	.45	.23	.04
25	.00	-.05	-.05	.02	1.9	3.2	.95	.65	.6	.35	.22	.03
26	-.01	-.04	-.03	.06	2.2	3.1	.75	.65	.5	.35	.19	.02
27	-.02	-.03	.00	.04	1.7	3.1	.6	.6	.5	.4	.18	.04
28	.00	-.05	.00	.05	1.25	3.0	.35	.55	.5	.35	.18	.03
29	-.02	-.15	.15	.05	1.9	3.0	.5	.5	.5	.45	.15	.04
30	-.01		.1	.04	2.6	2.9	.8	.45	.45	.35	.12	.04
31	-.03		.03		3.2		1.4	.4		.35		.03

Daily discharge, in second-feet, of Tensleep Creek near Tensleep, Wyo., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1.....	44	42	42	46	53	1,000	920	492	82	104	82	54
2.....	42	44	42	47	54	1,000	880	385	82	112	76	53
3.....	40	44	39	50	53	1,360	880	566	76	112	70	51
4.....	42	42	46	55	55	1,640	840	529	70	120	76	51
5.....	44	43	46	50	53	1,360	720	269	76	112	70	52
6.....	44	42	44	46	52	1,480	760	317	82	120	69	50
7.....	45	43	42	53	53	1,440	800	198	76	128	69	51
8.....	46	44	42	54	59	1,840	604	492	70	120	70	55
9.....	47	42	42	50	62	1,480	455	492	82	120	70	54
10.....	46	45	42	49	70	1,720	385	253	155	120	70	55
11.....	45	45	43	46	76	920	301	155	120	128	70	57
12.....	47	44	42	50	70	1,560	301	165	112	128	76	54
13.....	46	42	42	49	70	1,480	317	146	112	104	70	52
14.....	47	44	44	47	76	1,080	368	137	128	112	70	53
15.....	47	46	50	51	70	920	420	128	120	104	69	54
16.....	48	45	45	50	76	529	301	120	120	96	67	53
17.....	47	47	42	48	89	492	301	186	128	104	66	52
18.....	46	45	42	46	137	455	301	334	120	96	67	52
19.....	42	44	41	49	175	402	334	269	146	96	65	50
20.....	42	45	42	50	269	566	529	253	137	82	66	50
21.....	46	45	44	49	385	720	720	155	128	89	67	49
22.....	47	44	44	47	455	800	455	128	120	96	66	48
23.....	47	45	46	46	455	840	301	128	120	89	65	48
24.....	46	43	42	47	350	920	223	137	128	96	68	50
25.....	46	42	42	48	492	1,000	186	128	120	82	67	49
26.....	45	43	44	51	604	960	146	128	104	82	64	48
27.....	45	44	46	50	420	960	120	120	104	89	63	50
28.....	46	42	46	50	269	920	82	112	104	82	63	49
29.....	45	36	60	50	492	920	104	104	104	96	50	50
30.....	45	55	50	760	880	155	96	96	82	57	50
31.....	44	49	1,000	317	89	82	49

NOTE.—Daily discharge determined from a fairly well defined rating curve.

Monthly discharge of Tensleep Creek near Tensleep, Wyo., for 1912.

[Drainage area, 245 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy. ^a
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
January.....	48	40	45.1	0.184	0.21	2,770	C.
February.....	47	36	43.5	.178	.19	2,500	C.
March.....	60	39	44.5	.182	.21	2,740	C.
April.....	55	46	49.1	.200	.22	2,920	B.
May.....	1,000	52	237	.967	1.11	14,600	B.
June.....	1,840	402	1,050	4.29	4.79	62,500	B.
July.....	920	82	436	1.78	2.05	26,800	B.
August.....	566	89	233	.951	1.10	14,300	B.
September.....	155	70	107	.437	.49	6,370	B.
October.....	128	82	103	.420	.48	6,330	B.
November.....	82	50	67.9	.277	.31	4,040	B.
December.....	57	48	51.4	.210	.24	3,160	B.
The year.....	1,840	36	206	.841	11.40	149,000	

^a Accuracy of estimates for January, February, and March reduced to allow for possibility of ice distorting the gage heights.

PAINTROCK CREEK NEAR HYATTVILLE, WYO.

Location.—In the Bighorn National Forest, in the NW. $\frac{1}{4}$ sec. 18, T. 50 N., R. 88 W., $1\frac{1}{2}$ miles southeast of the Longview ranger station and about 12 miles east of Hyattville; 400 yards below the mouth of the North Fork, the nearest tributary.

Records available.—October 28, 1911, to June 14, 1912.

Drainage area.—81 square miles (measured from topographic sheet).

Gage.—Vertical staff.

Channel.—Probably permanent.

Discharge measurements.—Made by wading.

Winter flow.—No data.

Diversions.—Prior to July 1, 1912, there were adjudicated diversions from Paintrock Creek amounting to 54 second-feet. Practically all the water is diverted below the station.

Accuracy.—Sufficient data to determine accuracy have not been obtained.

Cooperation.—Station maintained in cooperation with the United States Forest Service.

Daily gage height, in feet, of Paintrock Creek near Hyattville, Wyo., for 1912.

[O. A. Emery, observer.]

Day.	Apr.	May.	June.	Day.	Apr.	May.	June.	Day.	Apr.	May.	June.
1.....		0.45	11.....				21.....			
2.....				12.....				22.....			
3.....				13.....				23.....			
4.....			4.40	14.....			4.10	24.....		2.10	
5.....			4.30	15.....				25.....			
6.....			4.40	16.....	0.04			26.....	0.45		
7.....			4.40	17.....		1.95		27.....			
8.....			4.50	18.....				28.....			
9.....		.82		19.....				29.....		2.60	
10.....				20.....				30.....			
								31.....			

PAINTROCK CREEK NEAR BONANZA, WYO.

Location.—In the SE. $\frac{1}{4}$ NE. $\frac{1}{4}$ sec. 19, T. 49 N., R. 90 W., near the farmhouse of William Paumer, $1\frac{1}{2}$ miles from Bonanza post office and 12 miles from Manderson, Wyo.; about $1\frac{1}{2}$ miles above junction with No Wood River.

Records available.—July 28, 1910, to October 31, 1912.

Drainage area.—Not measured.

Gage.—Chain gage on the right bank of the stream, directly in front of the house of the observer.

Channel.—Bed of stream rocky and clean; probably permanent.

Discharge measurements.—Made by wading at the gage at low and ordinary stages, and from the highway bridge, one-fourth mile below, in flood.

Winter flow.—Ice common at gaging station.

Diversions.—Water for irrigation is diverted above the station.

Accuracy.—Results fair.

Discharge measurements of Paintrock Creek near Bonanza, Wyo., in 1912.

Date.	Hydrographer.	Gage height.	Discharge.
		<i>Feet.</i>	<i>Sec.-ft.</i>
June 16	W. A. Lamb.....	4.99	707
Aug. 10	R. R. Randell.....	3.21	190
Oct. 4do.....	2.98	150

Daily gage height, in feet, of Paintrock Creek near Bonanza, Wyo., for 1912.

[Mrs. V. Paumer, observer.]

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
1....	2.62	2.63	5.3	6.7	4.4	2.23	2.94	16....	2.62	2.81	4.9	4.1	2.55	2.93	2.84
2....	2.63	2.70	5.7	5.5	4.05	2.25	2.93	17....	2.74	2.91	4.8	3.85	2.67	2.85	2.76
3....	2.64	2.71	6.3	5.5	4.0	2.05	2.94	18....	2.74	3.22	4.6	4.0	3.03	2.85	2.77
4....	2.70	2.71	6.5	4.6	3.95	2.15	2.96	19....	2.64	3.50	4.6	3.85	3.16	3.13	2.75
5....	2.64	2.74	6.5	4.6	3.65	2.26	3.33	20....	2.72	3.80	5.0	5.1	3.04	3.04	2.73
6....	2.64	2.72	6.8	4.4	3.26	2.23	3.35	21....	2.74	4.0	5.6	4.4	2.94	2.96	2.66
7....	2.62	2.73	6.7	4.2	3.34	2.27	3.06	22....	2.70	4.0	-----	3.95	2.85	2.96	2.66
8....	2.62	2.73	6.8	4.7	3.75	2.34	3.06	23....	2.61	3.75	5.7	3.75	2.65	3.03	2.77
9....	2.63	2.82	7.5	4.0	3.36	2.37	3.04	24....	2.62	3.6	5.6	3.65	2.63	2.95	2.74
10....	2.62	2.83	7.6	4.2	3.14	3.33	3.03	25....	2.64	3.75	5.7	3.3	2.54	2.93	2.73
11....	2.70	3.13	7.4	4.1	3.06	2.75	2.94	26....	2.70	4.15	6.1	3.2	2.46	2.86	2.75
12....	2.81	3.02	7.3	4.25	3.03	2.75	2.93	27....	2.63	4.2	5.8	3.15	2.44	3.25	2.73
13....	2.72	3.01	6.9	4.2	2.95	2.77	2.86	28....	2.64	3.95	5.5	2.95	2.34	2.93	2.84
14....	2.71	3.00	6.3	4.3	2.75	2.86	2.86	29....	2.62	4.0	5.4	2.83	2.25	2.86	2.73
15....	2.70	2.83	5.4	4.6	2.66	2.93	2.84	30....	2.64	4.8	5.4	2.85	2.24	2.84	2.75
								31....	-----	5.2	-----	2.85	2.23	-----	2.74

Daily discharge, in second-feet, of Paintrock Creek near Bonanza, Wyo., for 1912.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
1....	35	36	830	1,430	590	30	132	16....	35	54	670	445	64	130	111
2....	36	42	990	950	472	32	130	17....	46	68	648	365	80	113	96
3....	37	43	1,230	960	455	18	132	18....	46	124	575	420	152	113	98
4....	42	43	1,320	610	435	24	136	19....	37	190	575	365	185	178	94
5....	37	46	1,320	610	330	33	234	20....	44	280	725	830	155	155	90
6....	37	44	1,460	535	210	30	240	21....	46	350	970	572	132	136	79
7....	35	45	1,410	472	235	34	160	22....	42	350	990	410	113	136	79
8....	35	45	1,460	658	372	40	160	23....	34	265	1,010	340	78	152	98
9....	36	56	1,800	400	242	42	155	24....	35	220	970	305	74	134	94
10....	35	57	1,850	472	180	234	152	25....	37	265	1,020	205	62	130	90
11....	42	106	1,750	435	160	94	132	26....	42	402	1,190	175	52	115	94
12....	54	86	1,700	500	152	94	130	27....	36	420	1,060	162	50	210	90
13....	44	84	1,500	482	134	98	115	28....	37	332	940	120	40	130	111
14....	43	82	1,230	518	94	115	115	29....	35	350	910	102	32	115	90
15....	42	57	870	630	79	130	111	30....	37	630	910	102	31	111	94
								31....	-----	790	-----	102	30	-----	92

NOTE.—Daily discharge determined as follows: Apr. 1 to June 16, from a fairly well-defined rating curve; June 17 to Aug. 9, by shifting channel method; Aug. 10 to Oct. 31, from a fairly well-defined rating curve; June 22, discharge interpolated.

Monthly discharge of Paintrock Creek near Bonanza, Wyo., for 1912.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accu- racy.
	Maximum.	Minimum.	Mean.		
April.....	54	34	39.3	2,340	B.
May.....	790	36	192	11,800	B.
June.....	1,850	575	1,130	67,200	C.
July.....	1,430	102	474	29,100	C.
August.....	590	30	176	10,800	B.
September.....	234	18	104	6,190	B.
October.....	240	79	120	7,380	B.
The period.....				135,000	

GREYBULL RIVER NEAR MEETEETSE, WYO.

Location.—In the NW. $\frac{1}{4}$ SE. $\frac{1}{4}$ sec. 15, T. 48 N., R. 101 W., 300 feet from Wilson's house, about 5 miles from Meeteetse, Wyo., on the road to Sunshine & Wilson's coal mine.

Records available.—September 14, 1910, to October 31, 1912.

Drainage area.—Not measured.

Gage.—Staff gage fastened to south span of the middle pier on the upstream side of bridge; datum unchanged.

Channel.—Bed of stream rocky.

Discharge measurements.—At flood stage made from the upstream side of the bridge; low-water measurements are made by wading either above or below the bridge.

Diversions.—Irrigation is carried on extensively by water diverted from this stream and its tributaries.

Accuracy.—Results fair.

Discharge measurements of Greybull River near Meeteetse, Wyo., in 1912.

Date.	Hydrographer.	Gage height.	Discharge.
June 21	W. A. Lamb.....	<i>Feet.</i>	<i>Sec.-ft.</i>
Aug. 7	R. Randell.....	3.25	1,260
Oct. 1do.....	2.61	590
		2.10	244

Daily gage height, in feet, of Greybull River near Meeteetse, Wyo., for 1912.

[Katherine Wilson, observer.]

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
1	0.86	2.8	3.8	3.7	2.0	2.1	16....	0.8	1.3	3.0	3.7	2.25	2.15	2.0
286	3.8	4.0	3.5	1.95	2.1	17....	.8	1.65	2.95	3.35	2.4	2.15	1.95
388	3.6	5.5	3.8	1.95	2.1	18....	.8	1.95	2.9	3.3	2.4	2.1	1.95
490	3.8	4.0	3.35	1.95	2.05	19....	.85	2.20	2.9	3.3	2.7	2.35	1.9
595	3.8	3.9	2.95	1.95	2.15	20....	.8	2.32	2.9	3.35	2.45	2.25	1.85
695	4.2	3.8	2.85	1.9	2.25	21....	.8	2.40	3.2	3.45	2.3	2.2	1.85
7	1.0	.95	4.8	3.8	2.7	1.85	2.25	22....	.85	2.20	3.6	3.3	2.3	2.25	1.9
8	1.0	1.05	5.2	3.8	2.75	1.85	2.25	23....	.85	1.98	4.0	3.3	2.25	2.25	1.85
9	1.1	1.35	4.8	3.7	2.7	2.0	2.3	24....	.85	1.80	4.2	3.2	2.35	2.25	1.8
10	1.00	1.5	4.2	3.7	2.45	2.0	2.3	25....	.85	1.95	3.8	3.15	2.15	2.2	1.8
11	.96	1.2	4.0	3.6	2.4	2.0	2.35	26....	.9	1.95	3.8	3.0	2.1	2.15	1.85
12	.95	1.15	3.8	3.45	2.4	1.95	2.35	27....	.9	2.0	3.8	2.95	2.15	2.1	1.9
13	.95	1.0	4.0	3.45	2.35	1.95	2.25	28....	.90	2.5	3.8	3.1	2.05	2.1	1.9
14	.85	1.0	3.6	3.45	2.35	2.05	2.05	29....	.88	2.8	3.9	3.0	2.0	2.15	1.85
15	.85	1.05	3.0	3.6	2.25	2.1	1.95	30....	.85	2.8	4.0	3.05	1.95	2.05	1.8
								31....	2.45	3.0	1.95	1.85

Daily discharge, in second-feet, of Greybull River near Meeteetse, Wyo., for 1912.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
1.		158	1,300	1,960	1,820	200	250	16.	145	280	950	1,820	330	275	200
2.		138	2,200	2,240	1,560	180	250	17.	145	425	900	1,360	430	275	180
3.		162	2,020	4,400	1,960	180	250	18.	145	595	850	1,300	430	250	180
4.		166	2,200	2,240	1,360	180	225	19.	156	770	850	1,300	660	395	160
5.		178	2,200	2,100	900	180	275	20.	145	872	850	1,360	465	330	140
6.		178	2,560	1,960	800	160	330	21.	145	940	1,180	1,500	360	300	140
7.	190	178	3,360	1,960	660	140	330	22.	156	770	1,690	1,300	360	330	160
8.	190	204	3,950	1,960	705	140	330	23.	156	613	2,240	1,300	330	330	140
9.	217	298	3,360	1,820	660	200	360	24.	156	505	2,520	1,180	395	330	120
10.	190	355	2,520	1,820	465	200	360	25.	156	595	1,960	1,120	275	300	120
11.	180	247	2,240	1,690	430	200	395	26.	166	595	1,960	950	250	275	140
12.	178	232	1,960	1,500	430	180	395	27.	166	625	1,960	900	275	250	160
13.	178	190	2,240	1,500	395	180	330	28.	166	1,030	1,960	1,060	225	250	160
14.	156	190	1,690	1,500	395	225	225	29.	162	1,300	2,100	950	200	275	140
15.	156	204	950	1,690	330	250	180	30.	156	1,300	2,240	1,000	180	225	120
								31.		985		950	180		140

NOTE.—Daily discharge determined as follows: Apr. 7 to June 6 from a poorly-defined rating curve, June 7 to Oct. 31 from a fairly well-defined rating curve.

Monthly discharge of Greybull River near Meeteetse, Wyo., for 1912.

[Drainage area, 758 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
April 7-30.	217	145	165	0.218	0.19	7,850	C.
May.	1,300	158	493	.650	.75	30,300	C.
June.	3,950	850	1,970	2.60	2.90	117,000	C.
July.	4,400	900	1,600	2.11	2.43	98,400	B.
August.	1,960	180	588	.776	.89	36,200	B.
September.	395	140	240	.317	.35	14,300	B.
October.	395	120	222	.293	.34	13,600	B.
The period.						318,000	

WOOD RIVER NEAR MEETEETSE, WYO.

Location.—In the SE. $\frac{1}{4}$ sec. 22, T. 48 N., R. 101 W., on the highway bridge 800 feet above the junction of Wood and Meeteetse rivers, 9 miles from Meeteetse post office, on the road running west to the Pitchfork ranch.

Records available.—September 15, 1910, to October 31, 1912.

Gage.—Staff fastened to the wind brace on the north side of the bridge.

Channel.—Bed of stream gravel.

Discharge measurements.—Made from the downstream side of bridge at high stages and by wading at medium and low stages.

Winter flow.—Ice present during winter months.

Diversions.—A few ditches, all above the station, divert water from this stream.

Accuracy.—Results fair.

Discharge measurements of Wood River near Meeteetse, Wyo., in 1912.

Date.	Hydrographer.	Gage height.	Dis-charge.
June 21	W. A. Lamb.	<i>Fect.</i> 2.25	<i>Sec.-ft.</i> 460
Aug. 7	R. R. Randell.	1.52	234
Oct. 1do.....	1.27	134

Daily gage height, in feet, of Wood River near Meeteetse, Wyo., for 1912.

[Guinevere Irwin, observer.]

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
1....	0.94	2.05	2.25	1.0	1.25	16....	.84	1.34	1.5	1.50	1.2	1.35
2....94	2.05	1.85	1.05	1.3	17....	.84	1.60	1.5	1.31	1.2	1.35
3....89	2.1	1.75	1.0	1.3	18....	.89	2.25	1.55	1.31	1.25	1.35
4....89	2.05	1.6	.95	1.35	19....	.82	2.05	1.75	1.21	1.4	1.3
5....89	1.85	1.5	.95	1.35	20....	.89	1.95	1.65	1.21	1.35	1.25
6....96	1.9	1.3	.85	1.4	21....	.84	1.9	2.3	1.75	1.16	1.3	1.25
7....99	2.25	1.5	.85	1.35	22....	.89	1.7	2.3	1.45	1.16	1.3	1.3
8....	1.14	1.14	1.9	1.4	1.0	1.35	23....	.89	1.55	2.4	1.45	1.16	1.3	1.25
9....	1.09	1.24	1.9	1.35	.95	1.35	24....	1.04	1.45	2.6	1.3	1.15	1.3	1.25
10....	1.04	1.34	1.7	1.40	1.0	1.4	25....	.90	1.6	2.35	1.35	1.1	1.3	1.25
11....	1.02	1.29	1.7	1.31	1.0	1.4	26....	.92	1.85	2.4	1.3	1.1	1.35	1.25
12....	.94	1.24	1.65	1.31	1.0	1.35	27....	.94	1.95	2.4	1.3	1.15	1.3	1.25
13....	.79	1.14	1.65	1.26	1.15	1.35	28....	.96	1.8	2.1	1.25	1.15	1.3	1.25
14....	.79	1.04	1.75	1.40	1.15	1.35	29....	.96	2.05	2.15	1.2	1.1	1.25	1.25
15....	.82	1.12	1.65	1.21	1.1	1.35	30....	.94	2.2	1.3	1.05	1.25	1.25
								31....	1.8	1.0	1.2

Daily discharge, in second-feet, of Wood River near Meeteetse, Wyo., for 1912.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
1....	70	398	468	76	128	16....	48	172	220	216	120	155
2....	70	398	328	89	140	17....	48	250	220	159	120	155
3....	58	415	295	75	140	18....	58	468	235	159	133	155
4....	58	398	250	68	155	19....	44	398	295	133	176	140
5....	58	328	220	68	155	20....	58	362	265	133	159	128
6....	75	345	160	49	170	21....	48	345	485	295	120	144	128
7....	82	468	220	49	155	22....	58	280	485	205	119	143	140
8....	120	120	345	189	74	155	23....	58	235	520	205	119	143	128
9....	108	145	345	174	66	155	24....	95	205	600	160	116	143	128
10....	95	172	280	188	73	170	25....	60	250	502	175	103	142	128
11....	90	158	280	161	73	170	26....	65	328	520	160	103	157	128
12....	70	145	265	161	72	155	27....	70	362	520	160	115	142	128
13....	33	120	265	147	109	155	28....	75	310	415	148	114	141	128
14....	38	95	295	187	108	155	29....	75	398	432	135	102	129	128
15....	44	115	265	135	96	155	30....	70	450	160	90	129	128
								31....	310	76	115

NOTE.—Daily discharge determined as follows: Apr. 8 to Aug. 7 from a rating curve fairly well defined above and poorly defined below a discharge of 75 second-feet; Aug. 8 to Oct. 1, by shifting channel methods, and Oct. 2 to Oct. 31 from a rating curve fairly well defined for discharges from 115 to 170 second-feet. The change in the rating curve Aug. 8 to Oct. 1 was comparatively slight and parallel, so that the results obtained by shifting channel method are fairly good.

Monthly discharge of Wood River near Meeteetse, Wyo., for 1912.

[Drainage area, 214 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
April 8-30.....	120	38	66.7	0.312	0.27	3,040	C.
May 1-29.....	468	58	204	.953	1.03	11,700	B.
June 21-30.....	600	415	493	2.30	.86	9,780	B.
July.....	468	135	272	1.27	1.46	16,700	B.
August.....	468	76	170	.794	.92	10,500	B.
September.....	176	49	109	.509	.57	6,490	B.
October.....	170	115	144	.673	.78	8,850	B.

SHOSHONE RIVER AT CORBETT DAM, WYO.

Location.—In the NE. $\frac{1}{4}$ sec. 7, T. 53 N., R. 100 W., at the Corbett diversion dam, 8 miles below Cody, Wyo.

Records available.—April 20, 1908, to December 31, 1912.

Drainage area.—Not measured at this station; the drainage area above Cody is 1,400 square miles. Sage Creek, the only important tributary that enters between this station and Cody, drains only about 25 square miles.

Gage.—Forty feet above the crest of the dam; readings represent height of water above crest.

Determinations of discharge.—The discharge is computed by considering the dam as a weir and the sluice gates as submerged orifices. The following formula for discharges over the crest was developed by W. A. Lamb from measurements at Cody, Wyo.: $Q=3.50 bh^{1.58}$. The dam is of reinforced concrete of the buttressed type, having on the upstream side a deck $2\frac{1}{2}$ feet thick sloping 1 to 1 and supported by buttresses 2 feet thick spaced 14 feet on centers; it raises the low-water elevation of the river 10.2 feet; the length between abutments is 400 feet.

Diversions and storage.—Little water is diverted above this station, but the Shoshone Reservoir with a capacity of 456,000 acre-feet controls the flow.

Cooperation.—Gage height and discharge into Corbett tunnel furnished by the United States Reclamation Service.

Accuracy.—Results should be fair.

Daily gage height, in feet, of Shoshone River at Corbett dam, Wyo., for 1912.

[O. K. Pettée, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1.....	0.87	0.38	0.34	0.48	0.61	0.85	1.25	1.26	1.30	1.35	1.30	1.25
2.....	.89	.39	.41	.52	.58	.8	1.30	1.28	1.30	1.34	1.29	1.25
3.....	.95	.39	.38	.58	.58	2.2	1.27	1.30	1.31	1.35	1.30	1.25
4.....	1.05	.39	.56	.72	.56	2.1	1.25	1.28	1.31	1.35	1.30	1.23
5.....	1.11	.42	.31	.71	.57	1.6	1.30	1.34	1.30	1.35	1.30	1.24
6.....	1.21	.43	.36	.57	.56	1.1	1.28	1.34	1.30	1.35	1.22	1.24
7.....	1.37	.43	.40	.52	.52	1.2	1.30	1.35	1.30	1.34	1.22	1.23
8.....	1.38	.43	.38	.45	.53	1.25	1.30	1.34	1.30	1.36	1.26	1.23
9.....	2.01	.35	.35	.72	.78	1.3	1.27	1.34	1.31	1.35	1.27	1.22
10.....	1.21	.36	.32	.76	.73	1.35	1.25	1.36	1.31	1.35	1.27	1.22
11.....	1.15	.36	.38	.76	.76	1.4	1.25	1.36	1.32	1.36	1.27	1.21
12.....	1.09	—5.86	.37	.71	.70	1.45	1.22	1.35	1.37	1.35	1.30	1.21
13.....	1.11	—8.46	.36	.65	.70	1.47	1.20	1.35	1.35	1.34	1.30	1.21
14.....	.77	—8.88	.35	.57	.71	1.50	1.20	1.34	1.35	1.33	1.30	1.21
15.....	.62	—8.14	.35	.54	.69	1.55	1.20	1.33	1.34	1.34	1.30	1.21
16.....	.55	—8.10	.39	.56	.71	1.58	1.20	1.33	1.36	1.33	1.30	1.20
17.....	.54	—8.10	.38	.55	1.00	1.52	1.18	1.33	1.35	1.33	1.30	1.19
18.....	.48	—8.00	.38	.52	1.85	1.50	1.20	1.32	1.36	1.34	1.29	1.19
19.....	.43	—8.23	.37	.52	1.85	1.50	1.22	1.34	1.35	1.33	1.28	1.18
20.....	.42	—8.67	.37	1.87	1.50	1.24	1.35	1.36	1.32	1.28	1.17
21.....	.42	—8.87	.34	.50	1.91	1.20	1.30	1.34	1.36	1.31	1.27	1.17
22.....	.43	—8.63	.38	.45	1.32	1.20	1.27	1.36	1.35	1.30	1.26	1.15
23.....	.44	—8.80	.39	.45	1.20	1.20	1.30	1.35	1.34	1.30	1.26	1.14
24.....	.43	0.38	.41	.51	1.0	1.20	1.32	1.34	1.34	1.30	1.24	1.13
25.....	.45	.38	.42	.48	1.0	1.17	1.33	1.33	1.35	1.29	1.24	1.14
26.....	.45	.38	.44	.51	.9	1.20	1.30	1.31	1.36	1.30	1.24	1.15
27.....	.46	.35	.46	.53	1.1	1.20	1.26	1.31	1.36	1.29	1.23	1.16
28.....	.39	.38	.48	1.2	1.20	1.28	1.29	1.34	1.29	1.23	1.15
29.....	.42	.40	.5575	1.24	1.26	1.28	1.34	1.28	1.25	1.14
30.....	.4149	.60	.70	1.21	1.25	1.28	1.35	1.28	1.25	1.15
31.....	.394575	1.25	1.31	1.30	1.16

NOTE.—Feb. 8–23 part or all of the flow of the river was going through the sluice gates. The gage heights indicate the amount going over the dam.

Daily discharge, in second-feet, of Shoshone River, including sluices and tunnel, at Corbett dam, Wyo., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1.	1,120	306	258	442	701	1,390	2,140	2,320	2,280	2,290	2,130	2,020
2.	1,160	318	344	502	652	1,290	2,270	2,280	2,280	2,260	2,100	2,020
3.	1,290	318	306	598	652	5,200	2,200	2,330	2,310	2,300	2,130	2,020
4.	1,520	318	282	836	620	4,870	2,130	2,250	2,310	2,300	2,130	1,980
5.	1,660	358	222	818	636	3,290	2,270	2,360	2,280	2,270	2,130	1,990
6.	1,900	372	282	582	613	1,990	2,220	2,350	2,280	2,260	1,950	1,980
7.	2,310	372	330	502	556	2,210	2,240	2,360	2,280	2,230	1,990	1,960
8.	2,340	369	306	400	582	2,310	2,230	2,330	2,270	2,290	2,090	1,960
9.	4,210	332	270	836	1,020	2,430	2,180	2,330	2,280	2,260	2,120	1,930
10.	1,900	345	234	908	956	2,540	2,170	2,400	2,270	2,260	2,120	1,930
11.	1,760	345	306	908	1,020	2,660	2,220	2,400	2,260	2,290	2,080	1,900
12.	1,620	322	294	818	912	2,790	2,220	2,370	2,360	2,280	2,130	1,900
13.	1,660	319	282	715	905	2,850	2,210	2,370	2,310	2,270	2,130	1,900
14.	926	292	270	582	915	2,930	2,210	2,350	2,300	2,250	2,130	1,900
15.	664	327	270	534	884	3,000	2,200	2,350	2,270	2,270	2,130	1,900
16.	550	347	318	566	919	3,060	2,200	2,380	2,320	2,250	2,130	1,880
17.	534	347	306	550	1,500	2,920	2,100	2,370	2,290	2,250	2,130	1,860
18.	442	359	306	502	3,790	2,860	2,160	2,310	2,320	2,270	2,100	1,860
19.	372	341	294	502	3,790	2,840	2,200	2,340	2,290	2,250	2,080	1,830
20.	358	304	294	540	3,860	2,840	2,230	2,340	2,320	2,220	2,080	1,810
21.	358	292	258	524	4,010	2,080	2,340	2,310	2,320	2,200	2,060	1,810
22.	372	306	306	454	2,320	2,080	2,240	2,370	2,290	2,170	2,030	1,760
23.	386	294	318	454	2,050	2,080	2,270	2,360	2,270	2,170	2,030	1,740
24.	372	306	344	540	1,600	2,080	2,310	2,370	2,270	2,150	1,980	1,710
25.	400	306	358	496	1,580	2,010	2,340	2,380	2,290	2,100	1,980	1,740
26.	400	306	386	540	1,350	2,080	2,300	2,360	2,320	2,130	1,980	1,760
27.	414	270	414	572	1,810	2,080	2,220	2,360	2,320	2,100	1,960	1,780
28.	318	306	442	609	2,060	2,080	2,260	2,320	2,260	2,100	1,960	1,760
29.	358	330	550	646	1,090	2,180	2,230	2,310	2,260	2,080	2,000	1,740
30.	344	456	684	1,060	2,060	2,240	2,300	2,290	2,080	2,010	1,760
31.	318	400	1,200	2,280	2,340	2,130	1,780

NOTE.—Sluice gates were open Feb. 8 to 23 only. Daily discharge for this period was computed from data furnished by the U. S. Reclamation Service.

Daily discharge, in second-feet, into Corbett tunnel at Corbett dam, Wyo., for 1912.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1.	54	314	137	295	152	31	24
2.	54	314	137	203	152	31	24
3.	54	330	137	203	152	43	24
4.	54	346	128	169	152	43	24
5.	54	346	137	134	152	12	12
6.	47	346	137	117	152	24
7.	54	330	110	101	152	58
8.	64	314	101	101	137	58
9.	80	299	123	101	122	58
10.	102	275	174	112	112	58
11.	112	267	218	112	85	22
12.	112	267	285	112	55	21
13.	105	266	326	112	46	39
14.	97	286	326	122	44	39
15.	101	202	315	140	37	39
16.	101	211	315	171	30	39
17.	101	202	275	156	30	39
18.	101	197	275	128	30	39
19.	101	179	275	109	30	39
20.	54	105	179	250	85	39
21.	54	128	197	206	80	39
22.	54	136	204	179	80	34
23.	54	171	208	142	101	44
24.	54	197	208	134	136	37	20
25.	54	179	197	134	175	30
26.	54	171	197	175	204	30
27.	54	171	197	191	204	29
28.	54	184	197	177	215	30
29.	54	204	197	201	226	30
30.	54	260	163	241	215	30	12
31.	307	276	178

NOTE.—Daily discharge furnished by the U. S. Reclamation Service and shows the amount diverted into the Garland Canal for use on the Shoshone project.

Monthly discharge of Shoshone River, including sluices and tunnel, at Corbett dam, Wyo., for 1913.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accu- racy.
	Maximum.	Minimum.	Mean.		
January.....	4,210	318	1,040	64,000	B.
February.....	372	270	325	18,700	B.
March.....	550	222	323	19,900	B.
April.....	908	400	605	36,000	B.
May.....	4,010	556	1,470	90,400	B.
June.....	5,200	1,290	2,570	153,000	B.
July.....	2,340	2,100	2,230	137,000	B.
August.....	2,400	2,250	2,340	144,000	B.
September.....	2,360	2,260	2,290	136,000	B.
October.....	2,300	2,080	2,220	136,000	B.
November.....	2,130	1,950	2,070	123,000	B.
December.....	2,020	1,710	1,870	115,000	B.
The year.....	5,200	222	1,620	1,170,000	

SOAP CREEK NEAR ST. XAVIER, MONT.

Location.—One-fourth mile above the headworks of Soap Creek ditch, in the W. $\frac{1}{2}$

NW. $\frac{1}{4}$ sec. 2, T. 6 S., R. 32 E., about 11 miles southeast of St. Xavier, Mont.

Records available.—September 11, 1911, to December 31, 1912.

Drainage area.—Not measured.

Gage.—An overhanging chain gage on the left bank about 100 feet above the ford.

Channel.—Permanent; bed of stream is gravel and sand at gage and firm gravel and cobblestones at the control 50 feet below the gage.

Discharge measurements.—Made by wading at the ford 100 feet below the gage.

Winter flow.—Stream frozen during the winter months; winter gage heights of no value.

Diversion.—None above gage.

Accuracy.—Data too meager to determine.

Discharge measurements of Soap Creek near St. Xavier, Mont., in 1911 and 1912.

Date.	Hydrographer.	Gage height.	Dis- charge.
1911. Sept. 11	W. A. Lamb.....	<i>Feet.</i> 3.05	<i>Sec.-ft.</i> 13.1
1912. May 25do.....	2.56	57
Oct. 17	R. R. Randell.....	3.38	27

Daily gage height, in feet, and discharge, in second-feet, of Soap Creek near St. Xavier, Mont., for 1911.

[W. J. Warrett, observer.]

Day.	September.		October.		November.		Day.	September.		October.		November.	
	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.		Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
1.			3.11	16			16.	3.10	15				
2.							17.						
3.					3.14	17	18.	3.10	15				
4.							19.						
5.							20.	3.10	15				
6.							21.			3.15	18		
7.							22.	3.08	14				
8.							23.						
9.							24.	3.12	16				
10.							25.						
11.	3.05	14			2.95	10	26.	3.10	15				
12.							27.						
13.							28.	3.12	16	2.98	11		
14.	3.08	14	3.15	18			29.						
15.							30.						
							31.						

NOTE.—Daily discharge determined from a fairly well defined rating curve.

Daily gage height, in feet, and discharge, in second-feet, of Soap Creek near St. Xavier, Mont., for 1912.

[W. G. Warrett, observer.]

Day.	May.		June.		Day.	May.		June.		Day.	May.		June.	
	Gage height.	Discharge.	Gage height.	Discharge.		Gage height.	Discharge.	Gage height.	Discharge.		Gage height.	Discharge.	Gage height.	Discharge.
1.					11.			3.29	26	21.				
2.			3.37	34	12.					22.			3.20	20
3.					13.					23.				
4.					14.					24.				
5.			3.31	28	15.			3.38	35	25.				
6.					16.					26.				
7.					17.			3.31	28	27.	3.58	59	3.26	24
8.			3.30	27	18.					28.			3.28	26
9.			3.30	27	19.			3.30	27	29.				
10.					20.					30.				
										31.	3.46	44		

NOTE.—Daily discharge determined from a fairly well defined rating curve.

ROTTENGRASS CREEK NEAR ST. XAVIER, MONT.

Location.—One-fourth mile above the crossing of the Bighorn canal, in the SW. $\frac{1}{4}$ SW. $\frac{1}{4}$ sec. 31, T. 4 S., R. 33 E., about 4 miles southeast of St. Xavier, Mont.

Records available.—September 9, 1911, to December 31, 1912.

Gage.—Overhanging chain gage on left bank.

Channel.—Liable to change; bed of stream is composed of sand and silt. The channel is deep and the current sluggish for several hundred feet above and below the gage.

Discharge measurements.—Made by wading above the gage.

Winter flow.—Channel freezes during the winter months; winter gage heights of no value.

Diversions.—None.

Accuracy.—Results should be fair.

Discharge measurements of Rottengrass Creek near St. Xavier, Mont., in 1911 and 1912.

Date.	Hydrographer.	Gage height.	Discharge.
1911 Sept. 9	W. A. Lamb	<i>Feet.</i> 2.29	<i>Sec.-ft.</i> a 0.32
1912 May 24do.....	5.80	86.
Oct. 17	R. R. Randell.....	4.31	13.9

a Velocity estimated.

Daily gage height, in feet, and discharge, in second-feet, of Rottengrass Creek near St. Xavier, Mont., for 1911.

[W. H. Broadbent, observer.]

Day.	September.		October.		November.		Day.	September.		October.		November.	
	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.		Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
1.....							16.....	2.47	0.9	3.37	7.7
2.....							17.....			3.18	5.8
3.....			2.70	2.0			18.....			3.10	5.0
4.....							19.....			3.23	6.3
5.....							20.....			2.98	3.8
6.....			2.97	3.8			21.....			2.97	3.8
7.....							22.....				
8.....							23.....				
9.....			2.96	3.7			24.....	2.32	.4	3.02	4.2
10.....			2.96	3.7			25.....				
11.....					3.15	5.5	26.....				
12.....	2.61	1.6	2.98	3.8			27.....	2.30	.3	3.10	5.0
13.....			2.97	3.8			28.....				
14.....	2.53	1.2	2.96	3.7			29.....				
15.....							30.....			3.18	5.8
							31.....				

NOTE.—Daily discharge determined from a rating curve well defined between gage heights 2.3 feet and 6 feet.

Daily gage height, in feet, of Rottengrass Creek near St. Xavier, Mont., for 1912.

[W. H. Broadbent, observer.]

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1.			5.4					
2.						3.37		
3.				7.5				
4.		9.2						
5.			4.9					4.7
6.								
7.								
8.	6.0	6.6						
9.								
10.								
11.		4.6	4.4		3.15			
12.								
13.		5.3						
14.								
15.	4.8							
16.								
17.								
18.	6.5							
19.								
20.	6.6	5.6			6.2			
21.								4.2
22.	6.6	6.6						
23.								
24.					3.45			
25.		5.6						
26.	6.4					4.0		
27.								
28.			2.8					
29.							4.8	
30.								
31.								

Daily discharge, in second-feet, of Rottengrass Creek near St. Xavier, Mont., for 1912.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1.			65					
2.						5.0		
3.				188				
4.		290						
5.			42					28
6.								
7.								
8.	98	134						
9.								
10.								
11.		32	26					
12.		60			4.0			
13.								
14.								
15.	38							
16.								
17.							14	
18.	128							
19.								
20.	134	75			100			
21.								18
22.	134	134						
23.								
24.					6			
25.		75						
26.	122					12		
27.								
28.			2.5					
29.							28	
30.								
31.								

NOTE.—Daily discharge determined as follows: Apr. 8 to July 31, from a rating curve well defined between gage heights 2.3 feet and 6.0 feet; Aug. 1 to Nov. 21, by the shifting channel method.

LITTLE BIGHORN RIVER NEAR WYOLA, MONT.

Location.—One-fourth mile below proposed headworks of Little Bighorn canal No. 3. in the N. $\frac{1}{2}$ SW. $\frac{1}{4}$ sec. 28, T. 8 S., R. 35 E., about 16 miles above the mouth of Lodge Grass Creek.

Records available.—September 7, 1911, to December 31, 1912.

Gage.—Overhanging chain gage on right bank.

Channel.—Practically permanent; bed of stream is composed of gravel and cobblestones.

Discharge measurements.—Made by wading at ford below the gage.

Winter flow.—Channel filled with ice during the winter months; winter gage heights are not reliable.

Diversion.—None.

Accuracy.—Results fair.

Discharge measurements of Little Bighorn River near Wyola, Mont., in 1912.

Date.	Hydrographer.	Gage height.	Discharge.
		<i>Feet.</i>	<i>Sec.-ft.</i>
Apr. 22	W. A. Lamb.....	4.15	119
May 27do.....	5.44	528
Oct. 22	R. R. Randell.....	4.41	127

Daily gage height, in feet, and discharge, in second-feet, of Little Bighorn River near Wyola, Mont., for 1912.

[C. C. Dillon, observer.]

Day.	May.		June.		July.		Day.	May.		June.		July.	
	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.		Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
1.....	4.05	102	5.7	655	5.55	575	16.....	4.8	270	6.2	950
2.....	4.1	110	5.9	770	5.55	575	17.....	4.85	288	6.2	950
3.....	4.1	110	6.1	890	5.6	600	18.....	4.8	270	5.9	770
4.....	4.15	118	6.1	890	5.55	575	19.....	300	5.6	600
5.....	4.15	118	6.0	830	5.6	600	20.....	450	5.75	682
6.....	4.15	118	6.1	890	5.5	550	21.....	500	5.85	740
7.....	4.4	165	6.2	950	5.45	528	22.....	500	5.65	628
8.....	4.5	190	6.3	1,010	5.4	505	23.....	450	5.85	740
9.....	4.55	202	6.4	1,200	5.3	460	24.....	400	5.75	682
10.....	4.5	190	6.9	1,400	5.25	438	25.....	350	5.75	682
11.....	4.5	190	6.6	1,200	5.15	395	26.....	5.3	460	5.7	655
12.....	4.6	215	6.6	1,200	5.05	358	27.....	5.3	460	5.7	655
13.....	4.6	215	6.4	1,080	5.1	375	28.....	5.45	528	5.75	682
14.....	4.7	240	6.4	1,080	29.....	5.5	550	5.7	655
15.....	4.75	255	6.1	890	30.....	5.7	655	5.7	655
							31.....	5.7	655

NOTE.—Daily discharge determined from a rating curve well defined between gage heights 4.0 feet and 5.5 feet and fairly well defined at other stages.

Monthly discharge of Little Bighorn River near Wyola, Mont., for 1912.

[Drainage area, 260 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accu- racy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
May.....	655	102	310	1.19	1.37	19,100	B.
June.....	1,400	600	855	3.29	3.67	50,900	B.
July 1-13.....	600	358	503	1.93	.93	13,000	A.

LITTLE BIGHORN RIVER NEAR CROW AGENCY, MONT.

Location.—At the Chicago, Burlington & Quincy Railroad bridge, 2 miles south of Crow Agency, Mont., in W. $\frac{1}{2}$ sec. 18, T. 3 S., R. 35 E., about 14 miles above the junction with Bighorn River.

Records available.—March 24, 1905, to June 30, 1906; September 7, 1911, to December 31, 1912.

Gage.—Vertical staff attached to downstream end of a pile bridge pier. The records from March 24, 1905, to June 30, 1906, were obtained from a standard chain gage attached to the upstream side of the railroad bridge at Crow Agency, about 2 miles farther downstream. No tributaries enter between these two points.

Channel.—Permanent, broken by the piers of the bridge. Bed of the stream is coarse gravel and cobblestones. Current is sluggish at the gage.

Discharge measurements.—Made from downstream side of the bridge; low water measurements are made by wading at the ford about 75 feet above the bridge.

Winter flow.—Affected by ice, which forms at the control below the bridge.

Diversion.—None.

Accuracy.—Results good.

Discharge measurements of Little Bighorn River near Crow Agency, Mont., in 1912.

Date.	Hydrographer.	Gage height.	Dis- charge.
1911.		<i>Fect.</i>	<i>Sec.-ft.</i>
Apr. 11	W. A. Lamb.....	5.95	931
a 11do.....	6.02	1,010
May 25do.....	5.53	682
Oct. 18	R. R. Randell.....	4.66	240

a Made from bridge at Crow Agency, 2 miles below gage.

Daily gage height, in feet, of Little Bighorn River near Crow Agency, Mont., for 1912.

[Donald J. Lewis, observer.]

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1.....		5.1	6.05	6.1	4.7	4.4	4.6
2.....		5.0	6.0	6.8	5.75	4.45	4.6	4.7
3.....		5.0	6.05	7.2	4.95	4.4	4.55	4.7
4.....		5.3	6.35	8.6	4.4	4.6	4.7
5.....		6.2	6.3	5.65	4.45	4.7
6.....		7.4	6.35	5.95	4.45	5.0	4.7
7.....		6.45	6.4	5.75	5.0
8.....		5.7	6.45	6.05	4.8	4.4	5.0
9.....		5.4	6.7	4.8	4.45	4.8	4.7
10.....		5.3	7.2	4.75	4.5	4.9

Daily gage height, in feet, of Little Bighorn River near Crow Agency, Mont., for 1912—
Continued.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
11.....	6.0	5.45	7.3	-----	4.95	4.5	4.85	-----
12.....	5.75	5.45	6.8	-----	4.7	4.5	4.8	-----
13.....	5.5	5.45	-----	-----	4.65	4.5	-----	-----
14.....	5.35	5.4	7.0	-----	4.6	4.55	4.7	-----
15.....	4.95	5.3	6.9	-----	-----	4.8	4.7	-----
16.....	4.9	5.3	6.6	-----	4.6	4.9	4.7	-----
17.....	5.35	5.25	6.35	-----	4.65	4.8	4.6	-----
18.....	5.4	5.4	6.1	-----	5.0	4.75	4.65	-----
19.....	5.6	5.5	5.9	-----	5.2	4.7	4.7	-----
20.....	5.7	5.75	5.75	5.0	4.85	4.9	4.65	-----
21.....	6.9	5.85	5.8	5.2	4.7	5.1	4.65	-----
22.....	5.9	5.85	5.8	5.2	4.6	4.95	4.65	-----
23.....	5.55	5.75	5.85	5.25	4.55	4.75	4.65	-----
24.....	5.4	5.6	5.95	5.15	4.55	4.8	4.65	-----
25.....	5.4	5.55	6.0	5.0	4.55	4.8	4.65	-----
26.....	-----	5.6	6.0	4.95	4.5	4.8	4.65	-----
27.....	-----	5.75	5.9	4.9	4.45	-----	4.8	-----
28.....	5.25	5.85	5.9	4.85	4.45	-----	4.85	-----
29.....	5.2	5.8	5.85	4.8	4.45	4.7	4.65	-----
30.....	5.1	5.8	5.8	4.8	4.45	4.6	4.65	-----
31.....	-----	6.15	-----	4.7	4.45	-----	4.75	-----

Daily discharge, in second-feet, of Little Bighorn River near Crow Agency, Mont., for 1912.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1.....	-----	430	1,030	1,060	250	150	215	260
2.....	-----	380	990	1,630	815	165	215	250
3.....	-----	380	1,030	1,980	358	150	198	250
4.....	-----	535	1,260	3,380	345	150	215	250
5.....	-----	1,140	1,220	748	332	165	298	250
6.....	-----	2,180	1,260	955	318	165	380	250
7.....	-----	1,340	1,300	815	304	158	380	250
8.....	-----	780	1,340	1,030	290	150	380	250
9.....	-----	590	1,540	-----	290	165	290	250
10.....	-----	535	1,980	-----	270	180	335	-----
11.....	990	620	2,080	-----	358	180	312	-----
12.....	815	620	1,630	-----	250	180	290	-----
13.....	650	620	1,720	-----	232	180	270	-----
14.....	562	590	1,800	-----	215	198	250	-----
15.....	358	535	1,720	-----	215	290	250	-----
16.....	335	535	1,460	-----	215	335	250	-----
17.....	562	508	1,260	-----	232	290	215	-----
18.....	590	590	1,060	-----	380	270	232	-----
19.....	715	650	920	-----	480	250	250	-----
20.....	780	815	815	380	312	335	232	-----
21.....	1,720	885	850	480	250	430	232	-----
22.....	920	885	850	480	215	358	232	-----
23.....	682	815	885	508	198	270	232	-----
24.....	590	715	955	455	198	290	232	-----
25.....	590	682	990	380	198	290	232	-----
26.....	563	715	990	358	180	290	232	-----
27.....	536	815	920	335	165	276	290	-----
28.....	508	885	920	312	165	263	312	-----
29.....	480	850	885	290	165	250	232	-----
30.....	430	850	850	290	165	215	232	-----
31.....	-----	1,100	-----	250	165	-----	270	-----

NOTE.—Daily discharge determined from a well-defined rating curve. Discharge interpolated for days for which gage heights are missing except July 9 to 19.

Monthly discharge of Little Bighorn River near Crow Agency, Mont., for 1912.

[Drainage area, 1,190 square miles]

Month.	Discharge in second-feet.				Run-off.		Accu- racy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
April 11-30.....	1,720	335	669	0.562	0.42	26,500	A.
May.....	2,180	380	760	.639	.74	46,700	A.
June.....	2,080	815	1,220	1.03	1.15	72,600	A.
July 20, days, 1-8, 20-31.....	3,380	250	806	.677	.50	32,000	A.
August.....	815	165	275	.231	.27	16,900	A.
September.....	430	150	235	.197	.22	14,000	A.
October.....	380	198	264	.222	.26	16,200	A.
November 1-9.....	260	250	251	.211	.07	4,480	A.

LODGEGRASS CREEK NEAR LODGEGRASS, MONT.

Location.—Above road crossing one-fourth mile above headworks of Lodgegrass ditch, in the SW. $\frac{1}{4}$ sec. 29, T. 6 N., R. 35 E., about 6 miles southwest of Lodgegrass, Mont.

Records available.—September 9 to December 31, 1912.

Drainage area.—Not measured.

Gage.—Overhanging chain gage on left bank, 50 feet above the road crossing.

Channel.—Permanent at control below the gage. Bed of stream is composed of mud and silt at the gage, but of firm gravel and cobblestones at the ford below the gage. Current sluggish at gage at low stages.

Discharge measurements.—Made by wading at the ford below the gage.

Winter flow.—Stream freezes over during winter months; winter gage heights of no value.

Diversion.—None.

Accuracy.—Results fair.

Discharge measurements of Lodgegrass Creek near Lodgegrass, Mont., in 1912.

Date.	Hydrographer.	Gage height.	Dis- charge.
		<i>Feet.</i>	<i>Sec.-ft.</i>
Apr. 12	W. A. Lamb.....	4.45	148
May 26	do.....	4.40	131
Oct. 19	R. R. Randell.....	3.63	39

Daily gage height, in feet, of Lodgegrass Creek near Lodgegrass, Mont., for 1912.

[Robert Campbell, observer.]

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1.....		3.9	5.5	4.45	3.5	3.6	3.5
2.....		3.8	5.0	4.0	3.45	3.55	3.55
3.....			5.5	5.05	4.75	3.6	3.55	3.55
4.....		4.15	5.25	5.15	3.9	3.5	3.55	3.65
5.....			5.15	5.55	3.9	3.6	3.6	3.65
6.....			5.1	5.3	3.85	3.6	3.75	3.6
7.....			5.3	5.15	3.8	3.45	3.95	3.7
8.....		4.5	5.5	4.65	3.85	3.5	3.8	3.7
9.....		4.15	5.6	3.75	3.8	3.75
10.....		4.05	5.7	4.15	3.7	3.45	3.85

Daily gage height, in feet, of Lodgegrass Creek near Lodgegrass, Mont., for 1912—Contd.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
11.....		4.15	6.2	4.1	3.75	3.5	3.7	-----
12.....	4.45	4.3	5.7	4.1	3.6	3.5	3.75	-----
13.....	4.45	4.2	-----	4.2	3.6	-----	3.65	-----
14.....	4.55	4.05	-----	4.25	3.7	3.45	3.65	-----
15.....	4.25	-----	-----	-----	3.6	-----	3.6	-----
16.....	4.0	-----	5.3	4.25	3.6	3.4	3.55	-----
17.....	4.0	-----	5.25	4.15	3.65	3.25	3.55	-----
18.....	3.5	4.15	5.0	4.15	3.9	-----	3.5	-----
19.....	3.8	-----	4.75	4.1	3.85	3.25	3.55	-----
20.....	4.05	-----	5.5	4.1	3.7	3.25	3.55	-----
21.....	4.2	-----	4.95	4.15	3.65	4.0	3.5	-----
22.....	5.3	-----	4.85	4.15	3.6	3.75	3.55	-----
23.....	4.6	-----	5.45	4.05	3.6	3.65	3.5	-----
24.....	4.4	4.45	-----	4.0	3.6	3.85	3.55	-----
25.....	4.95	4.15	5.1	3.95	3.6	-----	3.55	-----
26.....	4.5	4.4	5.15	3.85	3.6	3.75	3.5	-----
27.....	4.2	-----	5.15	3.9	3.6	-----	3.55	-----
28.....	4.2	4.5	5.2	3.85	3.6	3.65	3.5	-----
29.....	4.5	4.6	5.05	3.8	3.55	3.55	3.55	-----
30.....	3.95	-----	-----	3.8	3.55	3.6	3.55	-----
31.....	-----	4.65	-----	3.85	3.5	-----	3.55	-----

Daily discharge, in second-feet, of Lodgegrass Creek near Lodgegrass, Mont., for 1912.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1.....	-----	68	210	347	142	34	41	34
2.....	-----	58	245	301	80	30	38	38
3.....	-----	78	347	255	195	41	38	38
4.....	-----	98	295	275	68	34	38	45
5.....	-----	111	275	358	68	41	41	45
6.....	-----	124	265	305	63	41	54	41
7.....	-----	137	305	275	58	30	74	49
8.....	-----	150	347	176	63	34	58	49
9.....	-----	98	369	137	54	32	58	54
10.....	-----	86	391	98	49	30	63	-----
11.....	-----	98	508	92	54	34	49	-----
12.....	142	120	391	92	41	34	54	-----
13.....	142	105	370	105	41	32	45	-----
14.....	158	86	350	112	49	30	45	-----
15.....	112	89	325	112	41	28	41	-----
16.....	80	92	305	112	41	27	38	-----
17.....	80	95	295	98	45	17	38	-----
18.....	34	98	245	98	68	17	34	-----
19.....	58	105	195	92	63	17	38	-----
20.....	86	112	347	92	49	17	38	-----
21.....	105	120	235	98	45	80	34	-----
22.....	305	128	215	98	41	54	38	-----
23.....	167	135	336	86	41	45	34	-----
24.....	135	142	300	80	41	63	38	-----
25.....	235	98	265	74	41	58	38	-----
26.....	150	135	275	63	41	54	34	-----
27.....	105	142	275	68	41	50	38	-----
28.....	105	150	285	63	41	45	34	-----
29.....	150	167	255	58	38	38	38	-----
30.....	74	172	301	58	38	41	38	-----
31.....	-----	176	-----	63	34	-----	38	-----

NOTE.—Daily discharge determined from a rating curve fairly well defined between gage heights 3 feet and 5 feet and poorly defined at higher stages. Discharge interpolated for days for which gage heights are missing.

Monthly discharge of Lodgegrass Creek near Lodgegrass, Mont., for 1912.

[Drainage area, 142 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
April 12-30.....	305	34	128	0.901	0.64	4,820	B.
May.....	176	68	115	.810	.93	7,070	C.
June.....	508	125	304	2.14	2.39	18,100	C.
July.....	358	58	140	.986	1.14	8,610	B.
August.....	195	34	57.2	.403	.46	3,520	B.
September.....	80	17	37.6	.265	.30	2,240	B.
October.....	74	34	42.7	.301	.35	2,630	B.
November 1-9.....	54	34	43.7	.308	.10	780	B.
The period.....						47,800	

TONGUE RIVER BASIN.

TONGUE RIVER NEAR DAYTON, WYO.

Location.—At the edge of the Bighorn National Forest, in the NE. $\frac{1}{4}$ sec. 11, T. 56 N., R. 87 W., 3 miles southwest of Dayton, $3\frac{1}{2}$ miles below the mouth of Sheep Creek.

Records available.—October 24, 1911, to May 25, 1912. From May 3 to October 31, 1903, a station was maintained at Dayton.

Drainage area.—214 square miles (measured from topographic sheets).

Gage.—Vertical staff.

Channel.—Apparently permanent.

Discharge measurements.—Made from highway bridge 2 miles below station during high water and by wading at the gage at ordinary stages.

Winter flow.—Ice causes some backwater during the winter months.

Diversions.—The only diversion above the station is a log flume which heads 15 miles above. One hundred feet below the station is the intake for the Highline Community ditch. Prior to July 1, 1912, there were adjudicated diversions from Tongue River amounting to 213 second-feet in Wyoming.

Accuracy.—Owing to a lack of discharge measurements, no estimates of flow have been made.

Cooperation.—Station is maintained in cooperation with the United States Forest Service.

Daily gage height, in feet, of Tongue River near Dayton, Wyo., for 1912.

[H. E. Anderson, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	Day.	Jan.	Feb.	Mar.	Apr.	May.
1.....		1.1		1.5	1.4	16.....		1.1			
2.....		1.1		1.5	1.5	17.....		1.1		1.3	
3.....		1.1		1.5		18.....					
4.....				1.5		19.....		1.1			2.7
5.....		1.8				20.....		1.1		1.3	2.9
6.....		1.8				21.....		1.1			
7.....		1.1		1.5		22.....	1.2				3.4
8.....		1.1		1.3		23.....	1.1			1.3	
9.....		1.1		1.3		24.....	1.1		1.1	1.3	3.4
10.....		1.1		1.3		25.....	1.1		1.1	1.4	3.6
11.....						26.....	1.1		1.1	1.4	
12.....		1.1		1.3		27.....	1.2		1.1	1.3	
13.....		1.1				28.....	1.1		1.1		
14.....		1.1				29.....	1.1			1.4	
15.....		1.1				30.....	1.1			1.4	
						31.....	1.1				

NOTE.—Gage heights Jan. 1 to Mar. 28 affected by ice.

TONGUE RIVER AT CARNEYVILLE, WYO.

Location.—At the highway bridge at Carneyville, Wyo., about 2 miles above the mouth of Big Goose Creek.

Records available.—May 25, 1911, to October 31, 1912.

Drainage area.—Not measured.

Gage.—Standard chain gage on highway bridge.

Channel.—Believed to be permanent; bed of stream is composed of gravel and cobblestones.

Discharge measurements.—Made from bridge at high stages and by wading at low and medium stages.

Winter flow.—Gage heights affected by ice during the winter months.

Diversion.—None.

Accuracy.—Results fair.

Discharge measurements of Tongue River at Carneyville, Wyo., in 1912.

Date.	Hydrographer.	Gage height.	Discharge.
		<i>Feet.</i>	<i>Sec.-ft.</i>
Apr. 13	W. A. Lamb.....	3.35	161
May 28do.....	5.75	1,310
Aug. 15	R. R. Randell.....	3.25	151
Oct. 9do.....	3.56	234

Daily gage height, in feet, of Tongue River at Carneyville, Wyo., for 1912.

[John Bone, observer.]

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
1.....		4.15	3.26	6.1	4.5	3.32	3.0	3.6
2.....		4.4	3.30	6.3	4.9	3.40	3.0	3.5
3.....		4.25	3.38	6.7	4.6	3.42	3.00	3.5
4.....		3.9	3.70	6.6	4.6	3.42	3.01	3.55
5.....		3.8	3.95	6.6	4.55	3.30	3.05	3.85
6.....		3.29	3.70	6.5	4.45	3.26	3.0	3.95
7.....		3.24	3.41	6.4	4.4	3.30	2.95	3.75
8.....		3.35	3.40	6.6	4.35	3.34	3.01	3.6
9.....		3.35	3.41	6.8	4.25	3.21	3.09	3.6
10.....		3.29	3.70	6.7	4.15	3.25	3.11	3.6
11.....		3.34	3.8	6.2	4.0	3.22	3.20	3.55
12.....		3.30	3.75	6.1	4.2	3.12	3.20	3.55
13.....		3.29	3.6	6.3	3.9	3.10	3.28	3.55
14.....		3.11	3.6	6.2	3.9	3.15	3.80	3.5
15.....		3.08	3.6	5.7	4.05	3.31	3.60	3.55
16.....		3.25	3.7	5.5	3.9	3.18	3.41	3.5
17.....		3.60	3.9	5.3	3.75	3.80	3.31	3.5
18.....		3.42	4.1	5.0	3.7	3.22	3.38	3.5
19.....		3.45	4.55	4.9	3.8	3.25	3.70	3.5
20.....		3.85	5.0	5.0	4.8	3.22	4.2	3.5
21.....		3.60	5.1	4.9	4.0	3.24	3.95	3.5
22.....		3.42	5.0	4.9	3.75	3.20	3.50	3.5
23.....		3.31	5.0	4.8	3.7	3.22	3.45	3.55
24.....		3.30	3.8	4.9	3.65	3.14	3.85	3.4
25.....		3.34	5.1	4.8	3.6	3.10	3.70	3.35
26.....		3.31	5.5	4.7	3.50	3.09	3.42	3.45
27.....	6.9	3.22	5.6	4.7	3.42	3.05	3.40	3.45
28.....	5.9	3.08	5.7	4.6	3.38	3.05	3.40	3.5
29.....	5.4	3.12	5.7	4.5	3.30	3.01	3.22	3.5
30.....	4.5	3.19	6.5	4.5	3.32	2.99	3.38	3.5
31.....	3.8	6.1	3.32	2.99	3.5

Daily discharge, in second-feet, of Tongue River at Carneyville, Wyo., for 1912.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
1.....		468	145	1,530	630	161	80	250
2.....		580	155	1,650	835	185	80	215
3.....		512	179	1,890	680	191	80	215
4.....		360	285	1,830	680	191	82	232
5.....		320	380	1,830	655	155	92	340
6.....		152	285	1,770	605	145	• 80	380
7.....		140	188	1,710	580	155	70	302
8.....		170	185	1,830	558	167	82	250
9.....		170	188	1,950	512	132	102	250
10.....		152	285	1,890	468	142	108	250
11.....		167	320	1,590	400	135	130	232
12.....		155	302	1,530	490	110	130	232
13.....		152	250	1,650	360	105	150	232
14.....		108	250	1,590	360	118	320	215
15.....		100	250	1,290	422	158	250	232
16.....		142	285	1,170	360	125	188	215
17.....		250	360	1,060	302	320	158	215
18.....		191	445	890	285	135	179	215
19.....		200	655	835	320	142	285	215
20.....		340	890	890	780	135	490	215
21.....		250	945	835	400	140	380	215
22.....		191	890	835	302	130	215	215
23.....		158	890	780	285	135	200	232
24.....		155	320	835	268	115	340	185
25.....		167	945	780	250	105	285	170
26.....		158	1,170	730	215	102	191	200
27.....	2,010	135	1,230	730	191	92	185	200
28.....	1,410	100	1,290	680	179	92	185	215
29.....	1,110	110	1,290	630	155	82	135	215
30.....	630	128	1,770	630	161	78	179	215
31.....	320	1,530	161	78	215

NOTE.—Daily discharge determined from a fairly well defined rating curve.

Monthly discharge of Tongue River at Carneyville, Wyo., for 1912.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accu- racy.
	Maximum.	Minimum.	Mean.		
March 27-31.....	2,010	320	1,100	10,900	B.
April.....	580	100	213	12,700	B.
May.....	1,770	145	598	36,800	B.
June.....	1,950	630	1,260	75,000	B.
July.....	835	155	414	25,500	B.
August.....	320	78	137	8,420	B.
September.....	490	70	181	10,800	B.
October.....	380	170	232	14,300	B.
The period.....	184,000

GOOSE CREEK AT SHERIDAN, WYO.

Location.—Above the mouth of Little Goose Creek, at the footbridge in city park at Sheridan, Wyo.

Records available.—From April 10, 1896, to August 1, 1897, and from May 14, 1911, to October 31, 1912.

Drainage area.—Not measured.

Gage.—Vertical staff attached to center pier of the footbridge. The gage readings from April 10, 1896, to August, 1897, were made from a gage at the Fifth Avenue Bridge, below the mouth of Little Goose Creek.

Channel.—Slightly shifting; bed of stream is composed of gravel and cobblestones.

Discharge measurements.—Made from the footbridge at high stages and by wading at low stages.

Winter flow.—Gage heights during winter months are affected by ice at the gage.

Diversion.—During the irrigation season the greater part of the flow is diverted for irrigation above the gage. About 7,500 acre-feet of water are stored in the mountains on the headwaters of the stream and diverted in the Little Goose Creek drainage area. There are also a number of smaller diversions into the Little Goose Creek drainage area after the stream leaves the mountains. The records at the station show the amount of water that is not used in the Goose Creek drainage basin above the mouth of Little Goose Creek.

Accuracy.—Results fair.

Discharge measurements of Goose Creek at Sheridan, Wyo., in 1912.

Date.	Hydrographer.	Gage height.	Discharge.
		<i>Feet.</i>	<i>Sec.-ft.</i>
May 28	W. A. Lamb.....	5.15	616
Aug. 21	R. R. Randell.....	3.52	58
Oct. 9do.....	3.52	136

Daily gage height, in feet, of Goose Creek at Sheridan, Wyo., for 1912.

[H. A. Loucks, observer.]

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
1.....		4.07	3.54	5.45	4.95	3.29	3.27	3.79
2.....		4.15	3.60	5.7	4.9	3.41	3.26	3.77
3.....		3.97	3.66	6.0	4.55	3.46	3.23	3.78
4.....		3.65	3.66	6.05	4.28	3.49	3.17	3.78
5.....		3.55	3.66	6.1	4.34	3.47	3.17	3.93
6.....		3.46	3.64	5.9	4.23	3.51	3.17	3.91
7.....		3.42	3.60	5.85	4.17	3.54	3.17	3.86
8.....		3.44	3.63	6.35	4.09	3.53	3.31	3.85
9.....		3.46	3.67	7.25	4.08	3.51	3.38	3.85
10.....		3.48	3.92	6.7	4.03	3.67	3.44	3.81
11.....		3.49	3.96	5.8	3.86	3.66	3.47	3.75
12.....		3.48	3.88	5.7	3.88	3.51	3.46	3.78
13.....		3.48	3.80	6.2	3.84	3.46	3.45	3.77
14.....		3.44	3.77	6.25	3.86	3.37	3.55	3.77
15.....		3.41	3.76	5.8	4.18	3.36	3.63	3.77
16.....		3.48	3.86	5.25	3.80	3.35	3.63	3.76
17.....		3.54	4.08	4.95	3.72	3.32	3.62	3.75
18.....		3.47	4.28	4.65	3.76	3.46	3.66	3.75
19.....		3.46	4.65	4.44	3.78	3.52	3.89	3.74
20.....		3.56	4.8	4.00	4.04	3.53	3.87	3.75
21.....		3.58	4.95	3.96	4.32	3.51	3.79	3.71
22.....		3.56	5.1	4.00	3.90	3.51	3.78	3.69
23.....		3.52	4.95	4.14	3.78	3.45	3.85	3.70
24.....		3.52	4.85	4.95	3.69	3.44	3.87	3.69
25.....		3.52	5.0	5.9	3.67	3.42	3.97	3.69
26.....	5.25	3.54	5.35	5.95	3.58	3.61	3.76	3.69
27.....	5.2	3.48	5.4	5.75	3.47	3.59	3.69	3.67
28.....	5.75	3.48	5.15	5.7	3.43	3.53	3.72	3.73
29.....	5.35	3.48	5.4	5.4	3.41	3.35	3.77	3.69
30.....	5.40	3.50	5.55	4.9	3.35	3.27	3.77	3.71
31.....	4.44		5.85		3.34	3.27		3.69

Daily discharge, in second-feet, of Goose Creek at Sheridan, Wyo., for 1912.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
1		134	48	890	480	34	37	128
2		152	55	1,150	450	46	36	124
3		114	63	1,480	288	51	34	126
4		62	63	1,540	204	54	29	126
5		49	63	1,590	222	52	29	158
6		39	61	1,370	189	56	29	152
7		35	55	1,320	172	61	29	142
8		37	59	1,860	153	60	46	140
9		39	65	2,860	151	56	53	140
10		41	105	2,250	141	80	61	132
11		42	112	1,260	109	79	65	120
12		41	98	1,150	112	56	51	126
13		41	84	1,700	106	51	50	124
14		37	80	1,760	109	42	62	124
15		34	78	1,260	175	41	92	124
16		41	94	705	100	40	92	122
17		48	136	480	88	37	90	120
18		40	185	328	94	51	96	120
19		39	315	252	97	58	138	118
20		50	380	135	143	60	134	120
21		53	460	127	216	56	118	112
22		50	560	135	115	56	116	108
23		45	460	165	97	50	134	110
24		45	405	480	84	49	138	108
25		45	490	1,370	80	47	160	108
26	675	48	770	1,420	67	72	116	108
27	630	41	820	1,200	52	68	104	106
28	1,200	41	620	1,150	48	60	108	116
29	770	41	840	840	46	40	118	108
30	820	43	990	450	40	37	118	112
31	234		1,320		39	37		108

NOTE.—Daily discharge determined as follows: Mar. 26 to May 27 from a poorly defined rating curve; May 28 to Aug. 21 from a fairly well defined rating curve; Aug. 22 to Oct. 8 by method for shifting channel; Oct. 9-31 from a poorly defined rating curve.

Monthly discharge of Goose Creek at Sheridan, Wyo., for 1912.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accu- racy.
	Maximum.	Minimum.	Mean.		
March 26-31	1,200	234	722	8,590	C.
April	152	34	52.2	3,110	C.
May	1,320	48	320	19,700	C.
June	2,860	127	1,090	64,900	B.
July	480	39	144	8,850	B.
August	80	34	52.8	3,250	B.
September	160	29	82.8	4,930	C.
October	158	106	122	7,500	C.
The period				121,000	

LITTLE GOOSE CREEK AT SHERIDAN, WYO.

Location.—At the footbridge about 200 yards above the point where the stream parallels the Chicago, Burlington & Quincy Railroad and about one-fourth mile above the junction with Big Goose Creek at Sheridan, Wyo.

Records available.—May 1, 1896, to August 1, 1897; May 14, 1911, to October 31, 1912.

Gage.—A staff attached to the downstream end of the right abutment of the footbridge. The gage read from May 1, 1896, to August 1, 1897, was at the Broadway Bridge, 600 feet below the site of the present gage.

Channel.—Liable to shift; bed of stream is composed of sand and gravel.

Discharge measurements.—Made from the downstream side of the footbridge; low-water measurements are made by wading.

Winter flow.—Stream freezes solid at the control below gage.

Diversions.—During the irrigation season, from May to September, the greater part of the stream is diverted for irrigation above the station. The records at this point show the amount of water that is not being used for irrigation

Accuracy.—Results obtained are good.

Discharge measurements of Little Goose Creek at Sheridan, Wyo., in 1912.

Date.	Hydrographer.	Gage height.	Discharge.
		<i>Feet.</i>	<i>Sec.-ft.</i>
Apr. 21	W. A. Lamb.....	3.40	70
May 28	do.....	4.15	355
Aug. 21	R. R. Randell.....	2.95	34
Oct. 9	do.....	3.28	95

Daily gage height, in feet, of Little Goose Creek at Sheridan, Wyo., for 1912.

[W. E. Hammontree, observer.]

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
1....	5.1	3.48	4.1	3.2	2.65	2.80	3.15	16....	3.30	3.55	3.68	2.90	2.70	3.05	3.25
2....	4.4	3.48	4.1	3.25	2.80	2.78	3.15	17....	3.32	3.68	3.65	2.9	2.72	3.1	3.25
3....	3.90	3.55	4.15	3.28	2.92	2.70	3.15	18....	3.30	3.82	3.45	2.90	3.25	3.1	3.25
4....	3.62	3.55	4.2	3.22	3.05	2.75	3.15	19....	3.3	4.00	3.40	2.88	3.02	3.15	3.25
5....	3.55	3.50	4.15	3.20	2.82	2.75	3.32	20....	3.35	4.05	3.38	3.22	3.05	3.22	3.25
6....	3.32	3.42	4.1	3.15	2.85	2.75	3.35	21....	3.42	4.2	3.35	3.02	2.95	3.15	3.25
7....	3.30	3.42	4.05	3.15	2.88	2.72	3.32	22....	3.40	4.2	3.32	2.95	2.95	3.12	3.25
8....	3.35	3.45	4.1	3.1	2.90	2.70	3.32	23....	3.35	4.2	3.32	2.92	2.92	3.12	3.25
9....	3.32	3.5	4.3	3.05	2.88	2.7	3.30	24....	3.32	4.05	3.32	2.90	2.92	3.25	3.25
10....	3.38	3.65	4.10	3.02	2.85	2.80	3.25	25....	3.30	4.05	3.30	2.82	2.95	3.2	3.25
11....	3.42	3.68	3.92	2.95	2.82	2.92	3.25	26....	3.38	4.1	3.3	2.80	2.9	3.2	3.25
12....	3.42	3.68	3.98	2.9	2.82	2.90	3.25	27....	3.35	4.1	3.30	2.80	2.9	3.2	3.25
13....	3.38	3.62	4.10	2.9	2.75	2.90	3.25	28....	3.32	4.2	3.32	2.7	2.85	3.2	3.25
14....	3.35	3.58	4.10	2.90	2.7	2.98	3.25	29....	3.38	4.1	3.22	2.7	2.85	3.2	3.25
15....	3.25	3.55	3.78	2.92	2.7	3.05	3.25	30....	3.42	4.25	3.20	2.70	2.85	3.2	3.25
								31....	4.25	2.68	2.82	3.25

Daily discharge, in second-feet, of Little Goose Creek at Sheridan, Wyo., for 1912.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
1....	625	90	340	80	8	17	70	16....	55	137	204	28	10	51	90
2....	355	92	340	90	17	16	70	17....	58	175	195	28	11	60	90
3....	190	107	358	96	31	10	70	18....	55	215	138	28	90	60	90
4....	115	109	375	84	51	14	70	19....	55	280	125	26	46	70	90
5....	100	100	358	80	19	14	105	20....	62	300	120	84	51	84	90
6....	58	86	340	70	22	14	112	21....	74	355	112	46	35	70	90
7....	55	86	322	70	26	11	105	22....	70	358	105	35	35	64	90
8....	62	96	340	60	28	10	105	23....	62	360	105	31	31	64	90
9....	58	109	410	51	26	10	100	24....	58	310	105	28	31	90	90
10....	67	147	340	46	22	17	90	25....	55	310	100	19	35	80	90
11....	74	160	277	35	19	31	90	26....	67	335	100	17	28	80	90
12....	74	161	298	28	19	28	90	27....	62	338	100	17	28	80	90
13....	67	146	340	28	14	28	90	28....	58	375	105	10	22	80	90
14....	62	140	340	28	10	39	90	29....	67	340	84	10	22	80	90
15....	48	135	234	31	10	51	90	30....	74	392	80	10	22	80	90
								31....	392	9	19	90

NOTE.—Daily discharge determined as follows: Apr. 1-30 from a poorly defined rating curve; May 1-2 by methods for shifting channel; May 28 to Oct. 31 from a well-defined rating curve.

Monthly discharge of Little Goose Creek at Sheridan, Wyo., for 1912.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accu- racy.
	Maximum.	Minimum.	Mean.		
April.....	625	48	98.1	5,840	C.
May.....	392	86	217	13,300	C.
June.....	410	80	226	13,400	A.
July.....	96	9	42.0	2,580	A.
August.....	90	8	27.0	1,660	A.
September.....	90	10	46.8	2,780	A.
October.....	112	70	89.9	5,530	A.
The period.....				45,100	

POWDER RIVER BASIN.**MIDDLE FORK OF POWDER RIVER AT KAYCEE, WYO.**

Location.—At highway bridge at Kaycee, Wyo.

Records available.—May 11, 1911, to October 31, 1912.

Drainage area.—Not measured.

Gage.—Vertical staff attached to the middle pier of the highway bridge.

Channel.—Permanent at control but shifting at gage. The bed of the stream is composed of gravel and cobblestones. Current sluggish at low water.

Discharge measurements.—Made from bridge at high stages and by wading at low stages.

Winter flow.—Gage heights during the winter months are affected by ice.

Diversion.—The greater part of the flow is diverted above the gage during the irrigation season.

Accuracy.—Results considered poor owing to lack of sufficient discharge measurements.

Discharge measurements of Middle Fork of Powder River at Kaycee, Wyo., in 1912.

Date.	Hydrographer.	Gage height.	Discharge.
May 31	W. A. Lamb.....	<i>Feet.</i> 8.22	<i>Sec.-ft.</i> 1,500
Aug. 19	R. R. Randell.....	3.39	86
Oct. 13do.....	3.45	110

Daily gage height, in feet, of Middle Fork of Powder River at Kaycee, Wyo., for 1912.

[P. A. Gatchell, jr., observer.]

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
1....	3.7	3.12	7.4	3.95	2.99	3.29	3.40	16....	3.1	3.45	4.8	3.41	3.39	3.47	3.45
2....	3.65	3.12	7.6	3.95	3.24	3.29	3.38	17....	3.1	3.6	4.8	3.31	3.39	3.49	3.42
3....	3.62	3.12	7.3	4.0	7.90	3.29	3.40	18....	3.2	3.6	4.6	3.27	3.39	3.59	3.45
4....	3.58	3.12	7.0	4.1	4.20	3.29	3.42	19....	3.2	4.0	4.4	3.19	3.39	3.95	3.42
5....	3.52	3.12	6.4	3.95	3.68	3.29	3.68	20....	3.2	4.8	4.4	3.49	3.39	3.57	3.45
6....	3.45	3.12	6.6	3.9	3.38	3.24	3.58	21....	3.25	5.3	4.3	3.19	3.39	3.49	3.45
7....	3.38	3.12	6.1	3.8	3.49	3.24	3.50	22....	4.15	5.9	4.3	3.14	3.39	3.44	3.42
8....	3.32	3.12	5.7	3.75	3.44	3.21	3.50	23....	3.35	5.8	4.25	3.14	3.39	3.44	3.45
9....	3.25	3.08	5.4	3.68	3.39	3.69	3.48	24....	3.2	5.5	4.2	3.14	3.39	3.59	3.38
10....	3.22	3.35	5.4	3.69	3.39	5.40	3.58	25....	3.1	5.8	4.2	3.09	3.37	3.44	3.40
11....	3.15	3.45	5.4	3.64	3.39	3.54	3.50	26....	3.1	6.2	4.15	3.09	3.34	3.39	3.40
12....	3.15	3.35	5.0	3.61	3.39	3.41	3.48	27....	3.45	6.5	4.1	3.09	3.29	3.39	3.38
13....	3.15	3.35	5.0	3.59	3.39	3.34	3.45	28....	3.35	7.4	4.0	3.07	3.29	3.54	3.40
14....	3.1	3.35	5.0	3.54	3.39	3.57	3.42	29....	3.20	7.6	3.9	3.01	3.29	3.44	3.40
15....	3.1	3.35	4.9	3.49	3.39	3.49	3.45	30....	3.12	8.0	3.85	2.99	3.29	3.41	3.50
								31....	7.9	2.99	3.29	3.45

Daily discharge, in second-feet, of Middle Fork of Powder River at Kaycee, Wyo., for 1912.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
1....	210	57	1,260	245	20	69	94	16....	53	134	500	96	92	111	106
2....	194	57	1,320	245	60	69	89	17....	53	178	500	73	92	116	99
3....	184	57	1,230	260	1,410	69	94	18....	73	178	440	65	92	141	106
4....	172	57	1,140	200	320	69	99	19....	73	260	380	50	92	245	99
5....	153	57	960	245	166	69	166	20....	73	500	380	116	92	136	106
6....	134	57	1,020	230	89	60	139	21....	84	650	350	50	92	116	106
7....	115	57	885	200	116	60	118	22....	392	830	350	42	92	104	99
8....	100	57	770	136	104	54	118	23....	108	800	335	42	92	104	106
9....	84	50	680	166	92	169	113	24....	73	710	320	42	92	141	89
10....	77	108	680	169	92	680	139	25....	53	800	320	34	87	104	94
11....	63	134	680	155	92	128	118	26....	53	910	305	34	80	92	94
12....	63	108	560	147	92	96	113	27....	134	990	290	34	69	92	89
13....	63	108	560	141	92	80	106	28....	108	1,260	260	31	69	128	94
14....	53	108	560	128	92	136	99	29....	73	1,320	230	22	69	104	94
15....	53	108	530	116	92	116	106	30....	57	1,440	215	20	69	96	118
								31....		1,410		20	69		106

NOTE.—Daily discharge determined from two poorly defined rating curves applicable Apr. 1 to May 18 and May 19 to Oct. 31.

Monthly discharge of Middle Fork of Powder River at Kaycee, Wyo., for 1912.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accu- racy.
	Maximum.	Minimum.	Mean.		
April.....	392	53	106	6,310	C.
May.....	1,440	50	437	26,900	C.
June.....	1,320	215	600	35,700	C.
July.....	290	20	119	7,320	C.
August.....	1,410	20	138	8,480	C.
September.....	680	54	125	7,440	C.
October.....	166	89	107	6,580	C.
The period.....				98,700	

CLEAR CREEK AT BUFFALO, WYO.

Location.—At concrete bridge at Buffalo, Wyo.

Records available.—May, 1896, to March 11, 1900; October 24, 1902, to November 30, 1904; May 8, 1911, to June 11, 1912. The records from May, 1896, to March 11, 1900, were obtained at a point 4 miles above Buffalo. All records since November 30, 1904, have been obtained at Buffalo.

Drainage area.—Not measured.

Gage.—Staff, set at a different datum from the gage used October 24, 1902, to November 30, 1904, but approximately the same site.

Channel.—Practically permanent; bed of stream is composed of cobblestones and firm gravel.

Discharge measurements.—Made from bridge at high stages and by wading at low stages.

Winter flow.—Gage heights affected by ice during the winter months.

Diversions.—The flow of the stream is appropriated and a large part is diverted for irrigation above the gage.

Accuracy.—Results fair.

Discharge measurements of Clear Creek at Buffalo, Wyo., in 1912.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		<i>Feet.</i>	<i>Sec.-ft.</i>			<i>Feet.</i>	<i>Sec.-ft.</i>
May 11	J. H. Rice.....	1.95	85	Oct. 11	R. R. Randell.....	2.32	46
30	W. A. Lamb.....	3.20	337	11do.....	2.30	39
Aug. 17	R. R. Randell.....	2.52	73				

^a Gage heights at new temporary section, and referred to different datum from measurements May 11 and May 30.

Daily gage height, in feet, and discharge, in second-feet, of Clear Creek at Buffalo, Wyo., for 1912.

[J. H. Rice, observer.]

Day.	April.		May.		June.		Day.	April.		May.		June.	
	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.		Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
1.....	1.5	30	3.0	290	16.....	1.35	18	2.11	105
2.....	1.60	40	2.95	278	17.....	1.3	15	2.18	117
3.....	1.48	28	3.25	355	18.....	1.3	15	2.31	139
4.....	1.42	24	3.25	355	19.....	1.30	15	2.42	159
5.....	1.45	26	1.45	26	3.1	315	20.....	1.42	24	2.32	141
6.....	1.38	21	1.4	22	3.2	340	21.....	1.38	21	2.50	175
7.....	1.32	16	42	3.2	340	22.....	1.38	21	2.45	165
8.....	1.50	30	62	3.5	430	23.....	1.40	22	2.25	128
9.....	1.45	26	1.95	82	3.5	430	24.....	1.42	24	2.18	117
10.....	1.40	22	2.12	106	3.5	430	25.....	1.50	30	2.23	125
11.....	1.52	32	1.98	85	2.9	265	26.....	1.48	23	2.60	195
12.....	1.50	30	1.85	68	27.....	1.42	24	2.6	195
13.....	1.45	26	1.62	42	28.....	1.45	26	2.6	195
14.....	1.40	22	1.68	48	29.....	1.55	35	2.7	217
15.....	1.38	21	1.76	57	30.....	1.68	48	3.1	315
							31.....	3.2	340

NOTE.—Daily discharge determined from a fairly well defined rating curve. Discharge interpolated May 7 and 8.

Monthly discharge of Clear Creek at Buffalo, Wyo., for 1912.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accu- racy.
	Maximum.	Minimum.	Mean.		
April 5-30.....	48	15	24.5	1,260	B.
May.....	340	22	116	7,130	B.
June 1-11.....	430	265	348	7,590	B.

CLEAR CREEK NEAR BUFFALO, WYO.

Location.—In the Bighorn National Forest, at Camp Comfort, in the SW. $\frac{1}{4}$ sec. 8, T. 50 N., R. 83 W., and 11 miles west of Buffalo, three-fourths of a mile below the junction of the North and South Forks.

Records available.—October 22, 1911, to June 28, 1912. From May 1, 1896, to March 11, 1900, a station was maintained by the State engineer at a point 4 miles west of Buffalo, where a measuring flume was built. From October 24, 1902, to December 31, 1904, a station was maintained at Buffalo. The records at the two points are not directly comparable, as a number of irrigation ditches divert water between and a few intermittent tributaries enter.

Drainage area.—110 square miles (measured from topographic sheets).

Gage.—Vertical staff.

Channel.—Data too meager to determine.

Discharge measurements.—Made from bridge during high water and by wading at ordinary stages.

Winter flow.—Ice causes backwater during the winter months.

Diversions.—There are no diversions above the station and the records at this point represent the natural run-off. Prior to July 1, 1912, there were adjudicated diversions from Clear Creek of 333 second-feet below the station.

Accuracy.—Owing to a lack of discharge measurements no estimates of flow have been made.

Cooperation.—Station maintained in cooperation with the United States Forest Service.

Daily gage height, in feet, of Clear Creek near Buffalo, Wyo., for 1912.

[August Hettinger, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	Day.	Jan.	Feb.	Mar.	Apr.	May.	June.
1.....		0.6	0.8	2.2	16.....			0.6		1.9
2.....						3.0	17.....						1.6
3.....			0.5		2.65	18.....		0.5				
4.....							19.....					1.6	1.5
5.....						2.4	20.....						
6.....			0.5		.7	2.5	21.....	0.55					1.7
7.....	1.4						22.....						
8.....							23.....				0.6		
9.....						3.0	24.....			0.6			2.2
10.....						2.8	25.....		0.6				
11.....					1.05		26.....					1.9	2.15
12.....		.6				2.7	27.....					1.8	
13.....	.55						28.....	.5			.6		2.5
14.....						2.7	29.....			0.7		1.95	
15.....				.5		2.0	30.....						
							31.....	.5				2.4	

NOTE—Gage heights Jan. 1 to Mar. 24 affected by ice.

PINEY CREEK AT KEARNEY, WYO.

Location.—At highway bridge 300 yards south of the post office at Kearney, Wyo.

Records available.—September 6, 1902, to June 30, 1906; May 13, 1911, to October 31, 1912.

Drainage area.—Not measured.

Gage.—Chain gage on highway bridge. The gage used from September 6, 1902, to June 30, 1906, was at the same site but at a different datum.

Channel.—Liable to change; bed composed of gravel and cobblestones. Current swift at high and medium stages.

Discharge measurements.—At high stages measurements are made from the bridge and at low stages by wading.

Diversions.—The greater part of the flow of this stream during the irrigation season is diverted for irrigation above the gage.

Accuracy.—Results fair.

Discharge measurements of Piney Creek at Kearney, Wyo., in 1912.

Date.	Hydrographer.	Gage height.	Dis-charge.
		<i>Feet.</i>	<i>Sec.-ft.</i>
June 1	W. A. Lamb.....	3.80	770
Aug. 16	R. R. Randell.....	2.09	91
Oct. 14do.....	2.03	90

Daily gage height, in feet, of Piney Creek at Kearney, Wyo., for 1912.

[Mrs. R. D. Noyce, observer.]

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
1.....		1.6	2.28	4.05	2.9	1.6	1.7	2.0
2.....		1.6	2.30	4.2	2.9	2.95	1.70	2.0
3.....		1.65	2.20	4.2	2.8	2.6	1.62	2.0
4.....		1.85	2.2	4.05	2.75	2.6	1.60	2.0
5.....		1.80	2.2	4.05	2.5	2.50	1.6	2.1
6.....		1.72	2.15	4.0	2.40	2.32	1.6	2.2
7.....		1.80	2.2	4.15	2.38	2.30	1.6	2.2
8.....		1.9	2.25	4.3	2.35	2.3	1.6	2.2
9.....		2.0	2.6	4.35	2.2	2.3	1.7	2.2
10.....		2.1	2.7	4.2	2.1	2.3	1.85	2.1
11.....		2.15	2.6	4.0	1.95	2.15	1.8	2.1
12.....		2.1	2.6	4.15	1.92	2.08	1.8	2.05
13.....		2.1	2.45	4.0	1.90	2.08	1.8	2.0
14.....		2.10	2.4	3.75	1.95	2.05	1.8	2.0
15.....		2.07	2.5	3.25	2.12	2.02	1.9	2.0
16.....		1.95	2.6	2.95	2.00	2.08	1.9	2.0
17.....		1.85	2.8	2.8	2.40	2.02	1.95	2.1
18.....		1.88	3.0	2.55	2.28	2.10	1.95	2.1
19.....		1.90	3.0	2.6	2.20	2.15	2.0	2.1
20.....		1.92	3.15	2.55	2.1	2.05	1.9	2.1
21.....		1.90	3.3	2.75	2.2	2.0	1.9	2.0
22.....		1.95	3.3	2.8	2.05	1.95	2.0	2.0
23.....		2.05	3.1	2.8	2.00	1.9	2.0	2.0
24.....		2.12	3.15	2.9	1.78	1.85	2.0	2.0
25.....		2.15	3.35	2.9	1.70	1.8	1.9	2.0
26.....		2.10	3.55	2.95	1.62	1.8	1.9	2.0
27.....	1.6	2.18	3.6	2.9	1.60	1.8	1.9	2.0
28.....	1.55	2.18	3.45	2.9	1.60	1.8	1.9	2.0
29.....	1.6	2.20	3.9	2.85	1.62	1.8	1.9	2.1
30.....	1.6	2.22	3.9	2.75	1.70	1.80	1.9	2.2
31.....	1.6	3.9	1.68	1.78	2.2

Daily discharge, in second-feet, of Piney Creek at Kearney, Wyo., for 1912.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
1.....		30	126	948	290	30	39	74
2.....		30	130	1,060	290	310	39	74
3.....		34	110	1,060	255	195	32	74
4.....		55	110	948	240	195	30	74
5.....		49	110	948	170	170	30	90
6.....		41	100	910	150	134	30	110
7.....		49	110	1,020	146	130	30	110
8.....		61	120	1,140	140	130	30	110
9.....		74	195	1,180	110	130	39	110
10.....		90	225	1,060	90	130	55	90
11.....		100	195	910	68	100	49	90
12.....		90	195	1,020	64	87	49	82
13.....		90	160	910	61	87	49	74
14.....		90	150	735	68	82	49	74
15.....		85	170	445	94	77	61	74
16.....		68	195	310	74	87	61	74
17.....		55	255	255	150	77	68	90
18.....		59	330	182	126	90	68	90
19.....		61	330	195	110	100	74	90
20.....		64	395	182	90	82	61	90
21.....		61	470	240	110	74	61	74
22.....		68	470	255	82	68	74	74
23.....		82	370	255	74	61	74	74
24.....		94	395	290	47	55	74	74
25.....		100	495	290	39	49	61	74
26.....		90	605	310	32	49	61	74
27.....	30	106	635	290	30	49	61	74
28.....	26	106	548	290	30	49	61	74
29.....	30	110	840	272	32	49	61	90
30.....	30	114	840	240	39	49	61	110
31.....	30	840	37	47	110

NOTE.—Daily discharge determined from a fairly well defined rating curve.

Monthly discharge of Piney Creek at Kearney, Wyo., for 1912.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accu- racy.
	Maximum.	Minimum.	Mean.		
March 27-31.....	30	26	29.2	290	B.
April.....	114	30	73.5	4,370	B.
May.....	840	100	330.	20,300	B.
June.....	1,180	182	605	36,000	B.
July.....	290	30	108	6,640	B.
August.....	310	30	97.5	6,000	B.
September.....	74	30	53.1	3,160	B.
October.....	110	74	85.4	5,250	B.
The period.....				82,000	

LITTLE MISSOURI RIVER BASIN.

LITTLE MISSOURI RIVER NEAR ALZADA, MONT.

Location.—At Walker's ranch, 2 miles below the mouth of Thompson Creek, near the southwest corner of T. 8 N., R. 60 E., 300 yards below a proposed dam site and 4 miles below Alzada, Mont.

Records available.—April 30, 1904, to November 30, 1906; June 18, 1911, to December 31, 1912. Estimates of daily discharge for 1912 can not be made until sufficient high-water measurements are obtained to define a rating curve.

Drainage area.—About 780 square miles.

Gage.—An overhanging chain gage on the right bank. During 1911 a vertical staff gage 150 feet farther downstream on the left bank was used. The chain-gage datum is 0.08 foot lower than that of the staff gage. They also have different points of control.

Channel.—May shift during high water. Stream sluggish; banks cut 5 to 15 feet in the sandy soil.

Discharge measurements.—At ordinary stages made by wading; at flood stages from a cable.

Winter flow.—Affected by ice.

Discharge measurements of Little Missouri River near Alzada, Mont., in 1911, 1912, and 1913.

Date.	Hydrographer.	Gage height.		Dis- charge.	Date.	Hydrographer.	Gage height.		Dis- charge.
		New gage.	Old gage.				New gage.	Old gage.	
1911.		<i>Feet.</i>	<i>Feet.</i>	<i>Sec.-ft.</i>	1913.		<i>Feet.</i>	<i>Feet.</i>	<i>Sec.-ft.</i>
June 18	Mahon and Heidel.....	0.6	^a 1.5	Apr. 22	C. S. Heidel.....	2.47	1.18	15.2
1912.					Sept. 19do.....	4.48	3.62	450
Apr. 17	W. A. Lamb.....	9.32	89.30	10.90	Sept. 20do.....	3.03	2.07	90
June 7	C. S. Heidel.....	2.34	.99	10.3	Sept. 21do.....	2.71	1.62	38
Oct. 30	W. A. Lamb.....	2.20	.72	2.2					

^a Estimated.

^b Accurate only to nearest half-tenth of a foot.

^c The mean of five float velocities using a coefficient of .85 was 2.34 feet per second, while the velocity computed by Kutter's formula was 2.18 feet per second. The mean of these was used to compute discharge, using the cross section of Oct. 30, 1912. The Little Missouri at Alzada, above Thompson Creek, carried 410 second-feet, as measured by current meter on April 17.

NOTE.—Daily gage heights for 1911 referred to the "Old gage." Daily gage heights for 1912 and 1913 referred to the "New gage."

Daily gage height, in feet, of Little Missouri River near Alzada, Mont., for 1911 and 1912

[John Walker, observer.]

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1911.									
1.				0.55	-0.25	0.6	0.45	0.55	0.7
2.				.55	-.25	.6	.45	.5	.7
3.				.5	-.25	.55	.5	.5	.7
4.				.5	-.25	.55	.5	.55	.7
5.				.45	-.25	.5	.45	.6	.65
6.				.4	-.25	.5	.5	.6	.6
7.				.4	-.25	.7	.45	.55	.55
8.				.3	2.75	.7	.45	.5	.5
9.				.3	3.1	.75	.45	.55	.5
10.				.3	1.45	.75	.45	.55	.6
11.				.2	1.2	.9	.45	.55	.6
12.				.2	.8	.8	.45	.55	.6
13.				.2	.6	.7	.45	.55	.6
14.				.1	1.0	1.6	.4	.55	.6
15.				.1	.8	2.4	.35	.55	.6
16.				.05	.7	2.45	.35	.55	.6
17.				.05	.6	1.25	.3	.55	.65
18.			0.6	.0	.55	1.0	.3	.6	.65
19.			.6	.0	3.8	.9	1.1	.65	.65
20.			.5	-.05	3.95	.75	.9	.7	.65
21.			.5	-.05	3.1	.7	.85	.7	.65
22.			.9	-.1	1.45	.6	.8	.7	.7
23.			.95	-.1	1.10	.6	.7	.7	.7
24.			.8	-.15	1.0	.55	.6	.75	.7
25.			.6	-.2	1.1	.55	.6	.75	.7
26.			.5	-.2	1.05	.5	.6	.7	.7
27.			.8	-.2	.9	.45	.55	.7	.7
28.			.7	-.2	.75	.5	.55	.7	.7
29.			.7	-.2	.65	.5	.55	.7	.7
30.			.6	-.25	.65	.45	.55	.7	.7
31.				-.25	.65		.55		.7
1912.									
1.		2.97	2.42	2.25	2.19	2.06	2.58	2.20	2.18
2.		2.97	2.38	2.47	2.67	2.06	2.38	2.21	2.19
3.		2.97	2.36	2.44	4.40	2.08	2.31	2.22	2.20
4.	10.0	2.81	2.34	2.79	5.0	2.05	2.28	2.21	2.19
5.	10.2	4.30	2.32	5.00	6.9	2.04	2.24	2.22	2.17
6.	15.3	8.0	2.34	6.7	5.7	2.04	3.50	2.22	2.17
7.	12.6	9.6	2.36	3.55	3.20	2.03	5.0	2.21	2.17
8.	11.1	10.1	2.32	2.73	2.74	2.02	4.6	2.22	2.19
9.	6.2	6.2	2.29	2.51	2.59	2.00	3.10	2.21	2.20
10.	7.4	4.0	2.31	2.43	2.43	2.03	2.71	2.19	2.20
11.		3.20	2.73	2.36	2.58	2.06	2.59	2.22	2.19
12.	5.8	2.94	5.90	2.38	2.41	2.03	2.44	2.21	2.19
13.		2.86	3.60	2.32	2.34	2.05	2.36	2.20	2.20
14.	6.3	2.74	2.84	2.27	2.32	2.03	2.32	2.20	2.22
15.	6.4	2.68	2.88	2.26	2.29	2.07	2.28	2.19	2.22
16.	4.5	2.60	3.15	2.25	2.21	2.11	2.26	2.18	2.22
17.	9.3	2.57	2.81	2.26	2.21	2.29	2.26	2.19	2.22
18.	9.6	2.57	2.55	2.25	3.40	2.35	2.20	2.19	2.21
19.	9.6	2.62	2.50	2.24	3.1	2.23	2.18	2.19	2.21
20.	9.5	2.53	2.42	2.22	3.20	2.25	2.11	2.18	2.21
21.	9.8	2.62	2.37	2.20	2.79	2.46	2.15	2.18	2.23
22.	9.0	4.70	2.33	2.20	2.44	2.51	2.15	2.18	2.26
23.	7.4	5.4	2.27	2.18	2.36	2.76	2.14	2.16	2.24
24.	5.4	5.6	2.26	2.23	2.30	4.20	2.12	2.16	2.24
25.	4.8	3.30	2.23	2.19	2.24	4.8	2.12	2.16	2.26
26.	4.5	2.77	2.20	2.26	2.21	5.2	2.12	2.16	2.26
27.	4.2	2.63	2.19	2.23	2.17	4.2	2.12	2.16	2.26
28.	3.9	2.62	2.16	2.40	2.15	3.4	2.15	2.18	2.26
29.	3.3	2.44	2.25	2.52	2.13	3.35	2.15	2.18	2.26
30.	3.15	2.40	2.24	2.33	2.09	3.0	2.15	2.18	2.26
31.		2.40		2.25	2.08		2.20		2.26

NOTE.—Gage heights Nov. 18 to Dec. 31, 1911, probably distorted by ice. Gage heights for 1912 referred to a new gage.

Daily discharge, in second-feet, of Little Missouri River near Alzada, Mont., for 1911.

Day.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Day.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1.....		1.0	0	1.5	0.2	1.0	2.5	16.....		0	2.5	173	0	1.0	1.5
2.....		1.0	0	1.5	.2	.5	2.5	17.....		0	1.5	19	0	1.0	2.0
3.....		.5	0	1.0	.5	.5	2.5	18.....	1.5	0	1.0	10	0	1.5	2.0
4.....		.5	0	1.0	.5	1.0	2.5	19.....	1.5	0	495	7.0	13	2.0	2.0
5.....		.2	0	.5	.2	1.5	2.0	20.....	.5	0	536	7.5	7.0	2.5	2.0
6.....		0	0	.5	.5	1.5	1.5	21.....	.5	0	333	2.5	5.8	2.5	2.0
7.....		0	0	2.5	.2	1.0	1.0	22.....	7.0	0	28	1.5	4.5	2.5	2.5
8.....		0	240	2.5	.2	.5	.5	23.....	8.5	0	13	1.5	2.5	2.5	2.5
9.....		0	321	3.5	.2	1.0	.5	24.....	4.5	0	10	1.0	1.5	3.5	2.5
10.....		0	28	3.5	.2	1.0	1.5	25.....	1.5	0	13	1.0	1.5	3.5	2.5
11.....		0	17	7.0	.2	1.0	1.5	26.....	.5	0	12	.5	1.5	2.5	2.5
12.....		0	4.5	4.5	.2	1.0	1.5	27.....	4.5	0	7.0	.2	1.0	2.5	2.5
13.....		0	1.5	2.5	.2	1.0	1.5	28.....	2.5	0	3.5	.5	1.0	2.5	2.5
14.....		0	10	37	0	1.0	1.5	29.....	2.5	0	2.0	.5	1.0	2.5	2.5
15.....		0	4.5	162	0	1.0	1.5	30.....	1.5	0	2.0	.2	1.0	2.5	2.5
								31.....		0	2.0		1.0		2.5

NOTE.—Daily discharge determined from a rating curve based on eight measurements made during 1911, 1912, and 1913, and well defined for discharges over 2 second-feet. No estimates were made for 1912 because of the lack of high-water discharge measurements to define a rating curve.

Monthly discharge of Little Missouri River near Alzada, Mont., for 1911.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accu- racy.
	Maximum.	Minimum.	Mean.		
June 18-30.....	8.5	0.5	2.85	73.5	B.
July.....	1.0	.0	.10	6.1	B.
August.....	536	.0	67.4	4,140	A.
September.....	173	.2	15.1	898	A.
October.....	13	.0	1.48	91.0	B.
November.....	3.5	.5	1.65	98.2	B.
December.....	2.5	.5	1.97	121	B.
The period.....				5,430	

KNIFE RIVER BASIN.

KNIFE RIVER NEAR BRONCHO, N. DAK.

Location.—At C. D. Smith's ranch, in the SE. $\frac{1}{4}$ sec. 4, T. 142 N., R. 90 W., at the former site of the post office of Broncho; the present post office is about 6 miles from the old site. Spring Creek enters about 15 miles below the station and Elm Creek half a mile above.

Records available.—May 29, 1903, to December 31, 1912.

Drainage area.—1,260 square miles; the drainage area at the present site is practically the same as at the original site, 2 miles farther downstream, the area at the lower point being perhaps 5 square miles greater.

Gage.—Chain, on left bank just below observer's house; datum unchanged since March 23, 1905, when the station was moved from the original site about 2 miles farther downstream.

Channel.—Practically permanent.

Discharge measurements.—At high stages made from car and cable 500 feet below gage; at low stages by wading.

Winter flow.—Affected by ice.

Accuracy.—Results fair.

Discharge measurements of Knife River near Broncho, N. Dak., in 1912.

Date.	Hydrographer.	Gage height.	Dis-charge.
Apr. 7	George Ebner.....	<i>Feet.</i> 11.10	<i>Sec.-ft.</i> 1,950
July 6	E. F. Chandler.....	3.90	20

Daily gage height, in feet, of Knife River near Broncho, N. Dak., for 1912.

[C. D. Smith, observer.]

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1.....			4.2	6.0	3.4	3.9	3.9		4.4	4.0
2.....		13.4	4.2	5.0	3.4	3.8	3.9	3.9	4.3	4.0
3.....		13.9	4.3	4.9	3.4	3.8	3.9	3.9	4.2	4.0
4.....		14.4	6.2	4.5	3.9	3.8	3.8	3.9	4.2	4.0
5.....		14.4	6.5	4.5	3.9	3.8	3.8	3.9	4.2	4.0
6.....		13.85	13.4	4.5	3.9	3.8	3.7	3.9	4.2	4.0
7.....		11.6	11.4	4.5	3.9	3.8	3.7	3.9	4.2	4.0
8.....		8.5	8.6	4.5	4.5	3.8	3.7	3.9	4.3	
9.....		7.05	6.6	4.4	5.5	3.8	3.7	3.9	4.3	
10.....		6.1	5.4	4.3	6.1	3.7	3.7	3.9	4.5	
11.....		6.1	4.9	4.2	6.3	3.7	3.7	3.9	4.5	
12.....		6.4	4.8	4.2	5.9	3.8	3.7	3.9	4.5	
13.....		6.8	4.6	4.2	5.4	3.8	3.7	3.9	4.5	
14.....		10.85	4.4	4.2	4.8	3.9	3.7	4.0	4.7	
15.....		14.0	4.4	4.3	4.3	3.9	3.7	4.0	4.8	
16.....		11.9	4.3	4.4	4.3	3.9	3.7	4.0	4.8	
17.....		8.65	4.2	4.6	4.3	3.9	3.7	4.0	4.5	
18.....		7.0	4.2	5.0	4.2	3.9	3.8	4.0	4.5	
19.....		6.5	4.2	4.8	4.2	4.2	3.9	4.0	4.5	
20.....		5.1	4.2	5.0	4.1	4.4	3.9	4.0	4.6	
21.....		4.8	4.3	4.8	4.0	4.4	3.9	4.0	4.7	
22.....		4.8	4.3	4.6	4.0	4.3	3.8	4.0	4.7	
23.....		4.7	4.4	4.2	4.0	4.6	3.8	4.0	4.6	
24.....		4.7	5.9	4.0	3.9	4.5	3.8	4.0	4.3	
25.....		4.6	5.6	4.0	3.9	4.5	3.8	4.0	4.3	
26.....		4.5	7.9	4.0	3.9	4.2	3.9	4.0	4.3	
27.....	6.6	4.5	9.95	4.0	4.0	4.3	4.1	4.1	4.3	
28.....	7.75	4.4	12.6	4.0	4.0	4.0	4.2	4.3	4.3	
29.....	17.45	4.3	10.55	4.0	3.9	4.0	4.1	4.3	4.2	
30.....	22.0	4.2	9.85	4.0	3.9	4.0	4.1	4.4	4.2	
31.....	18.25		9.0		3.9	3.9		4.4		

Daily discharge, in second-feet, of Knife River near Broncho, N. Dak., for 1912.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1.....		3,560	40	298	4	22	22	27	57
2.....		2,920	40	131	4	17	22	22	48
3.....		3,158	48	117	4	17	22	22	40
4.....		3,370	336	67	22	17	17	22	40
5.....		3,370	396	67	22	17	17	22	40
6.....		3,137	2,920	67	22	17	13	22	40
7.....		2,155	2,070	67	22	17	13	22	40
8.....		925	958	67	67	17	13	22	40
9.....		514	417	57	210	17	13	22	48
10.....		317	193	48	317	13	13	22	67
11.....		317	117	40	356	13	13	22	67
12.....		376	103	40	280	17	13	22	67
13.....		459	78	40	193	17	13	22	57
14.....		1,837	57	40	103	22	13	27	78
15.....		3,200	57	48	48	22	13	27	78

Daily discharge, in second-feet, of Knife River near Broncho, N. Dak., for 1912—Contd.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
16.....		2,282	48	57	48	22	13	27	78
17.....		975	40	78	48	22	13	27	57
18.....		502	40	131	40	22	17	27	57
19.....		396	40	103	40	22	22	27	57
20.....		146	40	131	33	57	22	27	67
21.....		103	48	103	27	57	22	27	78
22.....		103	48	78	27	48	17	27	78
23.....		90	57	40	27	78	17	27	67
24.....		90	280	27	22	67	17	27	48
25.....		78	227	27	22	67	17	27	40
26.....		67	741	27	22	40	22	27	40
27.....	33	67	1,460	27	27	48	33	33	27
28.....	96	57	2,580	27	27	27	40	48	27
29.....	2,940	48	1,711	27	22	27	33	48	17
30.....	5,000	40	1,420	27	22	27	33	57	13
31.....	4,210		1,100		22	22		57	

NOTE.—Discharge determined from a fairly well-defined curve.

Monthly discharge of Knife River near Broncho, N. Dak., for 1912.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accu- racy.
	Maximum.	Minimum.	Mean.		
April.....	3,560	40	1,160	69,000	C.
May.....	2,920	40	571	35,100	B.
June.....	298	27	70.1	4,170	B.
July.....	356	4	69.4	4,270	B.
August.....	78	13	30.1	1,850	B.
September.....	40	13	18.9	1,120	B.
October.....	57	22	28.5	1,750	B.
November.....			52.2	3,110	D.
The period.....				120,000	

HEART RIVER BASIN.

HEART RIVER NEAR RICHARDTON, N. DAK.

Location.—In or near sec. 21, T. 138 N., R. 92 W., about 11 miles south of Richardton; opposite the observer's house, which is 1 mile below the highway bridge at which the station was formerly maintained.

Records available.—May 18, 1903, to December 31, 1912.

Drainage area.—1,250 square miles.

Gage.—Overhanging chain gage installed September 4, 1911, opposite the observer's house, its zero being set so that a reading of 3.3 on the rod gage 30 rods above is 23.3 on the chain gage. This overhanging chain gage was destroyed by the flood of March 27, 1912, and on April 1 a temporary staff gage was installed at observer's house and was used until May 6, when a new chain gage was installed. All gage readings for 1912 have been referred to the chain gage installed on May 6.

Channel.—Not permanent.

Discharge measurements.—At high stages, made from bridge; at ordinary and low stages, by wading.

Winter flow.—Affected by ice.

Accuracy.—Results fair.

Discharge measurements of Heart River near Richardton, N. Dak., in 1912.

Date.	Hydrographer.	Gage height.	Dis-charge.	Date.	Hydrographer.	Gage height.	Dis-charge.
		<i>Feet.</i>	<i>Sec.-ft.</i>			<i>Feet.</i>	<i>Sec.-ft.</i>
Apr. 6	George Ebner	34.70	2,400	May 6	George Ebner	28.71	827
8	do.	29.02	650	July 7	E. F. Chandler	24.32	33.1
May 5	do.	25.45	74	Aug. 31	do.	24.22	22.8

Daily gage height, in feet, of Heart River near Richardton, N. Dak., for 1912.

[W. F. Church, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1				38.1	25.3	27.1	24.25	24.2	24.1	24.15	24.15	24.1
2				35.5	25.2	26.0	24.25	24.2	24.1	24.15	24.15	24.1
3				35.1	25.2	25.55	24.25	24.15	24.1	24.15	24.2	24.1
4				34.6	25.3	25.2	24.25	24.15	24.3	24.15	24.2	24.1
5				34.1	25.4	25.0	24.2	24.15	24.1	24.15	24.25	24.1
6				34.55	28.0	24.8	24.2	24.15	24.1	24.10	24.25	
7				32.0	34.2	24.7	25.82	24.1	24.1	24.1	24.25	
8				29.1	32.1	24.6	27.4	24.1	24.1	24.1	24.25	
9				28.2	28.7	24.5	25.6	24.1	24.1	24.1	24.25	
10				27.4	25.9	24.5	32.2	24.1	24.1	24.1	24.25	
11				27.2	25.7	25.45	33.4	24.1	24.1	24.15	24.25	
12				27.2	25.4	25.8	29.2	24.1	24.1	24.15	24.3	
13		23.3		26.9	25.2	25.7	27.4	24.1	24.1	24.15	24.4	
14				29.2	25.0	25.5	26.3	24.1	24.1	24.15	24.5	
15		23.8		33.5	24.8	25.4	26.0	24.1	24.1	24.15	25.9	
16				31.3	24.7	25.35	25.7	24.1	24.1	24.1	25.9	
17				30.0	24.5	25.2	25.15	24.1	24.1	24.1	25.3	24.1
18			23.9	29.7	24.5	25.1	24.9	24.1	24.1	24.05	25.1	
19			24.5	29.0	24.5	27.1	24.8	24.15	24.1	24.05	24.9	
20			25.1	28.2	24.5	26.3	24.7	24.2	24.1	24.05	24.8	
21			25.7	27.3	24.5	25.9	24.6	24.3	24.1	24.05	24.7	
22			25.2	27.0	24.55	25.4	24.5	24.5	24.1	24.02	24.5	
23			24.9	26.7	24.6	24.9	24.5	25.9	24.15	24.02	24.5	
24			24.8	24.9	26.4	24.9	24.7	24.45	25.1	24.15	24.02	24.4
25			24.4	26.3	26.1	25.2	24.6	24.45	24.9	24.15	24.02	24.4
26			26.15	26.1	25.1	24.5	24.4	24.7	24.15	24.02	24.3	
27			30.2	26.0	24.9	24.5	24.4	24.5	24.15	24.02	24.3	
28			38.8	25.6	24.9	24.4	24.35	24.4	24.15	24.05	24.2	
29			24.0	30.6	25.3	26.12	24.3	24.3	24.3	24.15	24.1	24.2
30				41.95	25.3	32.2	24.25	24.3	24.2	24.15	24.1	
31		23.2		41.5		30.2	24.2	24.1		24.15		24.1

NOTE.—Gage heights were obtained as follows: To Mar. 27, from chain gage at observer's house; this gage was destroyed by flood on Mar. 27. Mar. 28-31, from gage at bridge 1 mile above observer's house. Apr. 1-5, from temporary staff gage installed by observer at observer's house. Apr. 6 to May 6, from temporary staff installed by hydrographer at observer's house. After May 6, from a chain gage which was installed on this date at observer's house. Gage heights Mar. 28 to May 6 have been referred to the new chain gage installed on May 6. Relation of gage height to discharge affected by ice during January, February, and March, and Nov. 14 to Dec. 31.

Daily discharge, in second-feet, of Heart River near Richardton, N. Dak., for 1912.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1		3,521	125	409	27	24	18	21	22
2		2,715	113	226	27	24	18	21	22
3		2,591	113	159	27	21	18	21	24
4		2,436	125	113	27	21	30	21	24
5		2,281	138	90	24	21	18	21	26
6		2,420	585	71	24	21	18	18	26
7		1,640	2,312	62	198	18	18	18	26
8		930	1,670	53	466	18	18	18	26
9		629	741	45	166	18	18	18	26
10		466	210	45	1,700	18	18	18	26

Daily discharge, in second-feet, of Heart River near Richardton, N. Dak., for 1912—Con.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
11.....		428	180	145	2,064	18	18	21	26
12.....		428	138	195	882	18	18	21	29
13.....		384	113	180	466	18	18	21	35
14.....		862	90	152	272	18	18	21	35
15.....		2,400	71	138	226	18	18	21	180
16.....		1,437	62	132	180	18	18	19	180
17.....		1,070	45	113	107	18	18	19	100
18.....		1,992	45	101	80	18	18	16	76
19.....		810	45	409	71	21	18	16	66
20.....		629	45	272	62	24	18	16	57
21.....	3	447	45	210	53	30	18	16	49
22.....	4	400	49	138	45	45	18	15	35
23.....	8	337	53	80	45	211	21	15	29
24.....	11	288	80	62	41	101	21	15	24
25.....	30	241	113	53	41	80	21	15	24
26.....	21	241	101	45	37	62	21	15	13.5
27.....	440	226	80	45	37	45	21	15	13.5
28.....	2,500	166	80	37	33	37	21	16	11
29.....	2,840	125	244	30	30	30	21	18	11
30.....	3,785	125	1,700	27	30	24	21	21	8
31.....	3,955		1,126		24	18		21	

NOTE.—Mean discharge Mar. 1-20 estimated at 2.0 second-feet. Discharge Mar. 21-31 and Nov. 14-30 estimated on account of ice. Discharge Apr. 1 to Nov. 13 determined from a fairly well-defined curve.

Monthly discharge of Heart River near Richardton, N. Dak., for 1912.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accu- racy.
	Maximum.	Minimum.	Mean.		
March.....	3,960		440	27,100	D.
April.....	3,520	125	1,060	63,100	C.
May.....	2,650	42	343	21,100	B.
June.....	424	26	128	7,620	B.
July.....	2,064	24	242	14,900	B.
August.....	211	19	34.7	2,140	B.
September.....	30	18	19.2	1,140	B.
October.....	21	15	18.3	1,130	B.
November.....	180		41.7	2,480	D.
The period.....				141,000	

CANNONBALL RIVER BASIN.

CANNONBALL RIVER NEAR STEVENSON, N. DAK.

Location.—On the west side of the river near the south side of sec. 23, T. 133 N., R. 82 W., at M. H. Burdick's house, immediately above the ford, about 1 mile southeast of the Stevenson schoolhouse and about 5 miles above Timmer, N. Dak. This station is about 1 mile above the gage at the old Stevenson station, at which observations are still occasionally made.

Records available.—June 10, 1903, to November 30, 1908; August 9, 1911, to December 31, 1912.

Drainage area.—3,670 square miles.

Gage.—Standard chain on projecting cantilever timber.

Channel.—Bed of stream composed of gravel and stones, in places covered with silt to the depth of 1 foot. At the rapids 600 feet below the gage the bed is of clean gravel and stones. During floods the silt may be washed away and later redeposited at some points.

Discharge measurements.—At low and medium stages made by wading at the ford 15 rods below the gage or at the riffle 55 rods below; at medium and high stages measurements may be made by use of the car and cable at the old Stevenson station, about 1 mile farther downstream. The discharge is practically the same at the two points except that a small draw, which enters midway between the gage and the cable on the north side, carries a small flow for a few hours after a rain.

Winter flow.—Affected by ice.

Discharge measurements of Cannonball River near Stevenson, N. Dak., in 1912.

Date.	Hydrographer.	Gage height.	Discharge.
Apr. 4	George Ebner	<i>Feet.</i> 18.77	<i>Sec.-ft.</i> 3,859
May 4	do.	13.85	126
July 4	E. F. Chandler	13.33	51
Sept. 2	do.	13.06	21.4

Daily gage height, in feet, of Cannonball River near Stevenson, N. Dak., for 1912.

[Mrs. M. H. Burdick, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1.			15.2	19.7	14.1	13.75	13.3	13.55	13.25	13.05	13.05	13.15
2.			15.2	21.0	14.0	13.7	13.3	13.45	13.25	13.1	13.05	13.05
3.			15.0	19.45	13.9	13.8	13.3	13.55	13.25	13.15	13.05	13.05
4.			15.0	18.8	13.85	14.3	13.35	13.45	13.2	13.1	13.05	13.2
5.		13.1	15.12	17.7	13.95	14.2	14.3	13.45	13.2	13.05	13.05	13.15
6.			15.5	17.05	13.95	14.15	13.7	13.40	13.15	13.1	13.10	13.15
7.			15.25	16.3	13.9	13.85	13.5	13.5	13.05	13.15	13.05	
8.			15.2	16.0	14.0	13.7	15.4	13.35	12.95	13.15	13.05	
9.			15.2	15.65	14.0	13.7	13.65	13.25	12.85		13.05	
10.			15.2	15.0	13.9	13.75	17.35	13.3	12.85	13.15	13.05	
11.			15.2	15.3	13.8	13.85	15.7	13.25	12.85	13.15	13.10	
12.			15.2	15.1	13.7	14.2	15.15	13.25	12.85	13.05	13.15	
13.			15.35	15.15	13.7	14.1	15.5	13.25	13.0	13.0	13.1	
14.		14.6	15.5	15.1	13.8	13.9	15.2	13.25	12.95	13.0	13.05	
15.		14.7	15.5	14.8	13.9	13.65	15.1	13.25	13.2	12.9	13.05	
16.			15.2	14.8	13.9	13.45	15.05	13.35	13.1	13.0	13.05	
17.		14.8	15.2	14.8	13.8	13.5	14.9	13.35	13.1	13.0	13.05	
18.		14.8	15.4	14.75	13.75	13.6	14.8	13.35	13.15	13.05	13.0	
19.		14.9	15.7	14.7	13.6	13.65	14.6	13.25	13.2	13.05	13.05	
20.		13.6	15.0	15.7	14.55	13.6	14.4	13.25	13.25	13.05	13.05	
21.			15.0	15.7	14.55	13.7	13.6	14.3	13.15	13.2	12.95	13.05
22.			15.0	15.7	14.65	13.8	13.65	14.25	13.15	13.25	12.95	13.05
23.			14.9	15.85	14.75	13.8	13.6	14.2	13.15	13.25	12.9	13.0
24.			15.1	16.1	14.55	13.7	13.55	14.2	13.05	13.3	12.85	13.05
25.			15.25	17.6	14.5	13.6	13.4	14.1	13.05	13.25	12.85	13.05
26.			15.25	18.3	14.45	13.55	13.45	14.1	13.15	13.3	12.85	13.1
27.			15.1	19.4	14.2	14.2	13.4	14.0	13.15	13.15	12.85	13.15
28.			15.2	20.7	14.4	14.8	13.4	13.9	13.15	13.1	12.9	13.2
29.			15.35	20.35	14.25	14.8	13.5	13.9	13.20	13.15	12.95	13.15
30.				18.82	14.2	14.9	13.4	13.8	13.25	13.15	13.0	13.15
31.				18.72		13.95		13.7	13.3		13.05	

NOTE.—Relation of gage height to discharge affected by ice in stream Jan. 1–Mar. 30 and Nov. 19–Dec. 31.

Daily discharge, in second-feet, of Cannonball River near Stevenson, N. Dak., for 1912.

Day.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1.....		18	4,960	185	108	44	76	40	22	22	9
2.....		18	6,360	160	99	44	62	40	25	22	5
3.....		7	4,680	137	117	44	50	40	30	22	5
4.....		7	3,980	127	241	50	62	34	25	22	12
5.....		13	2,810	148	212	241	62	34	22	22	9
6.....		34	2,140	148	198	99	56	30	25	25	9
7.....		15	1,410	137	127	69	69	22	30	22	
8.....		12	1,160	160	99	737	50	15	30	22	
9.....		12	900	160	99	3,820	40	10	30	22	
10.....		12	515	137	108	2,450	44	10	30	22	
11.....		12	677	117	127	935	40	10	30	25	
12.....		12	566	99	212	593	40	10	22	30	
13.....		15	593	99	185	800	40	18	18	25	
14.....		25	566	117	137	620	40	15	18	22	
15.....		25	422	137	91	566	40	34	12	22	
16.....		7	422	137	62	540	50	25	18	22	
17.....	9	7	422	117	69	467	50	25	18	22	
18.....	11	15	401	108	83	422	50	30	22	18	
19.....	12	40	380	83	91	341	40	34	22	15	
20.....	18	40	323	83	83	272	40	40	22	15	
21.....	18	35	323	99	83	241	30	34	15	15	
22.....	18	35	360	117	91	226	30	40	15	15	
23.....	12	50	401	117	83	212	30	40	12	12	
24.....	25	83	323	99	76	212	22	44	10	9	
25.....	30	323	305	83	56	185	22	40	10	9	
26.....	30	677	288	76	62	185	30	44	10	12	
27.....	18	1,500	212	212	56	160	30	30	10	9	
28.....	25	3,020	272	422	56	137	30	25	12	12	
29.....	30	3,500	226	422	69	137	34	30	15	9	
30.....		2,930	212	467	56	117	40	30	18	9	
31.....		3,900		148		99	44		22		

NOTE.—Discharge determined from a curve fairly well defined between 18 and 4,200 second-feet. Discharge Feb. 17 to Mar. 30 and Nov. 19 to Dec. 6 estimated on account of ice.

Monthly discharge of Cannonball River near Stevenson, N. Dak., for 1912.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accu- racy.
	Maximum.	Minimum.	Mean.		
March.....	3,900	7	529	32,500	D.
April.....	6,360	212	1,220	72,600	B.
May.....	467	83	157	9,650	B.
June.....	241	56	108	6,430	B.
July.....	3,820	45	486	29,900	B.
August.....	76	22	43.3	2,660	B.
September.....	44	10	29.1	1,730	B.
October.....	30	10	20.0	1,230	B.
November.....	30	9	18.3	1,090	C.
The period.....				158,000	

GRAND RIVER BASIN.

NORTH FORK OF GRAND RIVER AT HALEY, N. DAK.

Location.—About 20 rods south of the post office at Haley, N. Dak., near the north-east corner of sec. 36, T. 129 N., R. 100 W.

Records available.—May 17, 1908, to December 31, 1912.

Drainage area.—500 square miles.

Gage.—Staff.

Channel.—Bed of stream composed of gravel and silt.

Discharge measurements.—At high stages made from car and cable 200 feet below gage; at low stages by wading.

Winter flow.—Affected by ice.

Accuracy.—Results poor.

Discharge measurements of North Fork of Grand River at Haley, N. Dak., in 1912.

[By H. N. Lungwitz, hydrographer.]

Date.	Time.	Gage height.	Dis-charge.	Date.	Time.	Gage height.	Dis-charge.
		<i>Feet.</i>	<i>Sec.-ft.</i>			<i>Feet.</i>	<i>Sec.-ft.</i>
Mar. 28	8 a. m.	5.42	261	Apr. 18	3 p. m.	4.07	134
28	11 a. m.	5.55	463	July 2 ^a	4 p. m.	.69	34
28	3 p. m.	6.10	559		5 p. m.	3.72	90
29	8 a. m.	4.94	668		9 a. m.	5.11	531
29	3 p. m.	6.94	1,262		12 m.	4.82	460
30	10 a. m.	5.77	501		5 p. m.	4.19	363
30	5 p. m.	5.63	469		8 a. m.	2.98	203
31	6 p. m.	5.98	372		5 p. m.	2.52	156
Apr. 1	11 a. m.	3.82	194		9 a. m.	2.48	101
1	5 p. m.	3.77	158		3 p. m.	2.07	128
2	6 p. m.	4.73	210		10 a. m.	1.82	121
3	5 p. m.	4.15	158		9 a. m.	1.61	85
15	6 p. m.	4.65	150		8 a. m.	3.72	287
16	9 a. m.	3.90	160		11 a. m.	3.57	291
17	9 a. m.	3.57	121		5 p. m.	3.15	234

^a By E. F. Chandler.

Daily gage height, in feet, of North Fork of Grand River at Haley, N. Dak., for 1912.

[H. N. Lungwitz, observer.]

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1.....		3.77	2.57	2.40	0.82	0.75	0.55	0.65	0.65	0.85
2.....		4.48	2.57	2.48	.74	.75	.55	.65	.65	.85
3.....		4.15	2.57	2.48	.74	.70	.55	.65	.75	.85
4.....		3.90	2.57	2.57	2.90	.65	.55	.65	.80	.85
5.....		3.57	2.57	2.57	4.69	.65	.55	.65	.85	.85
6.....		3.48	2.57	2.57	2.78	.65	.55	.65	.85	.85
7.....		3.23	3.32	2.57	2.03	.65	.55	.65	.85	.85
8.....		2.82	5.07	2.57	1.78	.65	.55	.65	.85	.85
9.....		2.53	4.36	2.40	1.67	.65	.55	.65	.85	.85
10.....		2.15	3.69	2.32	1.73	.65	.55	.65	.85	.85
11.....		1.69	3.11	2.32	1.65	.65	.55	.65	.85	.85
12.....		2.19	2.94	2.32	1.65	.65	.55	.65	.85	.85
13.....		2.65	2.82	2.32	3.44	.65	.55	.65	.85	.85
14.....		2.78	2.73	2.32	2.28	.55	.55	.65	.85	.85
15.....		4.32	2.61	2.32	1.57	.55	.65	.65	.85	.85
16.....		3.94	2.57	2.23	1.38	.55	.55	.65	.85	.85
17.....		3.69	2.65	2.19	1.21	.55	.55	.65	.85	.85
18.....		4.07	2.73	2.15	1.15	.55	.55	.65	.85	.85
19.....		3.69	2.65	2.15	1.15	.55	.55	.65	.85	.85
20.....		3.19	2.61	2.15	1.05	.55	.55	.65	.85	.85
21.....		3.03	2.57	2.15	1.00	.55	.55	.65	.85	.85
22.....		2.99	2.57	2.15	.98	.55	.55	.65	.85	.85
23.....		3.07	2.57	1.94	.90	.55	.55	.65	.85	.85
24.....		2.94	2.57	1.73	.85	.55	.55	.65	.85	.85
25.....		2.90	2.57	1.73	.82	.55	.55	.65	.85	.85
26.....	2.6	2.82	2.57	1.48	.80	.55	.55	.65	.85	.85
27.....	2.7	2.82	2.57	1.15	.75	.55	.55	.65	.85	.85
28.....	5.75	2.57	2.48	1.15	.75	.55	.55	.65	.85	.85
29.....	6.12	2.57	2.48	.98	.75	.55	.65	.65	.85	.85
30.....	5.73	2.57	2.4075	.55	.65	.65	.85	.85
31.....	6.03	2.4075	.556585

NOTE.—Relation of gage height to discharge affected by ice to Apr. 18 and Nov. 15 to Dec. 31, and by obstructions in stream Apr. 19 to June 26.

Daily discharge, in second-feet, of North Fork of Grand River at Haley, N. Dak., for 1912.

Day.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1.....		175	62	65	3	1	0.1	0.4	0.4
2.....		185	62	74	1	1	.1	.4	.4
3.....		160	62	74	1	.4	.1	.4	1.2
4.....		150	62	84	208	.2	.1	.4	2.0
5.....		150	62	84	449	.2	.1	.4	3.5
6.....		150	62	84	195	.2	.1	.4	3.5
7.....		140	144	84	112	.2	.1	.4	3.5
8.....		130	354	84	85	.2	.1	.4	3.5
9.....		120	261	76	73	.2	.1	.4	3.5
10.....		100	185	78	79	.2	.1	.4	3.5
11.....		70	121	78	70	.2	.1	.4	3.5
12.....		80	102	78	70	.2	.1	.4	3.5
13.....		90	89	78	271	.2	.1	.4	3.5
14.....		100	79	78	140	.1	.1	.4	3.5
15.....		135	66	78	62	.1	.1	.4	1.2
16.....		135	62	68	42	.1	.1	.4	1.2
17.....		135	70	64	26	.1	.1	.4	1.2
18.....		134	79	59	21	.1	.1	.4	1.2
19.....		118	70	59	21	.1	.1	.4	1.2
20.....		97	66	59	13	.1	.1	.4	1.2
21.....		90	62	59	10	.1	.1	.4	1.2
22.....		86	62	59	9	.1	.1	.4	1.2
23.....		95	62	48	5	.1	.1	.4	1.2
24.....		91	62	37	3	.1	.1	.4	.4
25.....		87	62	37	2	.1	.1	.4	.4
26.....	40	78	62	32	2	.1	.1	.4	.1
27.....	80	78	62	21	1	.1	.1	.4	.1
28.....	420	62	63	21	1	.1	.1	.4	.1
29.....	1,000	62	63	9	1	.1	.2	.4	.1
30.....	500	62	54	6	1	.1	.2	.4	.1
31.....	380		54		1	.1		.4	

NOTE.—Daily discharge June 27 to Nov. 14, determined from a curve, well defined for stages above 100 second-feet. Discharge Mar. 26 to June 26 was obtained from this same curve by applying corrections to gage heights for ice and other obstructions in stream.

Monthly discharge of North Fork of Grand River at Haley, N. Dak., for 1912.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accu- racy.
	Maximum.	Minimum.	Mean.		
March 26-31.....	1,000	40	403	4,800	C.
April.....	185	62	112	6,660	C.
May.....	354	54	89.9	5,530	D.
June.....	84	9	80.5	3,600	D.
July.....	449	1	63.8	3,920	B.
August.....	1	.1	.20	12	C.
September.....	.2	.1	.11	7	C.
October.....	.4	.4	.40	25	C.
November.....	3.5	.1	2.04	121	C.
The period.....				24,700	

GRAND RIVER NEAR WAKPALA, S. DAK.

Location.—At the new steel highway bridge 4 miles south of Wakpala, S. Dak., a station on the Chicago, Milwaukee & Puget Sound Railway, in or near sec. 8, T. 19 N., R. 29 E.

Records available.—September 9 to December 31, 1912.

Drainage area.—5,300 square miles.

Gage.—Standard chain on the foot guardrail at the downstream side of the bridge.

Channel.—Probably shifts somewhat; bed composed of sand; current medium; banks steep.

Discharge measurements.—Made from highway bridge; at very low stages measurements may be made by wading at the ford 40 rods below the bridge.

Accuracy.—Results poor, owing to uncertainty of gage heights and shifting character of stream.

Discharge measurements of Grand River near Wakpala, S. Dak., in 1912.

Date.	Hydrographer.	Gage height.	Dis-charge.	Date.	Hydrographer.	Gage height.	Dis-charge.
		<i>Feet.</i>	<i>Sec.-ft.</i>			<i>Feet.</i>	<i>Sec.-ft.</i>
Apr. 3	George Ebner.....	7.71	1,338	Sept. 4	E. F. Chandler.....	3.63	58.2
May 2do.....	3.70	93do.....do.....	3.58	46
July 3	E. F. Chandler.....	2.73	11.3	Oct. 28	W. B. Stevenson.....	2.87	11.6

Daily gage height, in feet, of Grand River near Wakpala, S. Dak., for 1912.

[F. Godfrey, observer.]

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1		7.0	4.3					
2							3.8	3.0
3				2.7	2.6			
4						3.7		
5			3.4			3.6	3.7	
6				8.0				3.0
7					2.1	3.0		
8		5.4	3.3					
9							3.4	2.9
10				7.0	2.0			
11		4.3				2.8		
12			3.2				3.3	
13	5.6			5.0				3.7
14					2.3	2.4		
15		3.4						
16	7.0						3.3	3.0
17		3.9		4.3	6.2			
18						2.1		
19							3.2	
20	4.9			3.2				3.0
21					4.1	2.0		
22		3.4	3.3					
23				4.2	4.2		3.2	2.9
24								
25	6.0	3.2				2.3		
26			3.0	3.7			3.0	
27	4.4			3.7				2.2
28		4.5			4.3	3.0	2.9	
29			2.9					
30							3.1	2.0
31				2.7	3.4			

Daily discharge, in second-feet, of Grand River near Wakpala, S. Dak., for 1912.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1		1,090	167	10	8	41	60	15
2		200	130	8	1	60	83	15
3		330	90	8	1	71	83	15
4		450	60	110	1	71	71	15
5		590	41	1,000	1	60	71	15
6		700	41	1,440	2	40	71	15
7		620	33	1,440	2	15	61	15
8		530	33	1,260	2	15	41	12
9		405	33	1,090	1	12	41	12
10		280	30	1,090	1	10	41	20

Daily discharge, in second-feet, of Grand River near Wakpala, S. Dak., for 1912—Con.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
11.....		167	26	800	1	10	33	30
12.....		132	26	550	2	10	33	45
13.....	600	100	26	390	4	4	33	71
14.....	760	70	26	300	4	4	33	45
15.....	920	41	26	250	100	4	33	30
16.....	1,090	56	26	200	600	3	33	15
17.....	890	74	30	167	810	2	33	15
18.....	690	96	33	110	600	2	26	15
19.....	410	78	33	60	450	2	26	15
20.....	355	63	33	26	250	1	26	15
21.....	430	51	33	30	126	1	26	15
22.....	500	41	33	60	126	2	26	12
23.....	555	35	27	105	145	3	26	12
24.....	650	30	23	145	145	4	26	12
25.....	740	26	18	110	145	4	15	7
26.....	465	56	15	71	125	4	15	3
27.....	190	116	15	71	110	15	14	3
28.....	300	220	12	71	110	15	12	3
29.....	500	220	12	40	110	25	16	1
30.....	850	192	12	8	41	40	20	1
31.....		167		8	41		20	

NOTE.—Daily discharge determined from a well-defined curve. Discharge for days on which gage was not read, interpolated or estimated.

Monthly discharge of Grand River near Wakpala, S. Dak., for 1912.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accu- racy.
	Maximum.	Minimum.	Mean.		
April 13-30.....	1,090	190	605	21,600	C.
May.....	1,090	26	233	14,300	C.
June.....	167	12	38	2,260	D.
July.....	1,440	8	356	21,900	C.
August.....	810	1	131	8,060	C.
September.....	71	1	18	1,070	D.
October.....	83	12	37	2,280	D.
November.....	71	1	17	1,010	D.
The period.....				72,500	

CHEYENNE RIVER BASIN.

BELLE FOURCHE RIVER NEAR BELLE FOURCHE, S. DAK.

Location.—At the diversion dam of the Belle Fourche irrigation project, in sec. 2, T. 8 N., R. 2 E., $\frac{1}{4}$ miles below Belle Fourche.

Records available.—May 10, 1906, to November 30, 1906; January 1 to December 31, 1912. Records of flow which did not account for certain diverted water which returned to the river below the station were maintained during 1910 and 1911, but have not been published.^a From May 26, 1903, to June 23, 1906, a station was maintained at the western edge of Belle Fourche. The records at the two points are not directly comparable, as Redwater River enters between and water is diverted from Belle Fourche River.

Drainage area.—4,270 square miles.

Gages.—An inclined staff 300 feet below the diversion dam.

Cooperation.—This station is maintained by the United States Reclamation Service, by whom the records are furnished.

^a Records for 1912 show entire flow of river, total discharge being obtained from measurements of Inlet Canal, Belle Fourche River at diversion dam, and from records of stored water in Belle Fourche Reservoir.

Discharge measurements of Belle Fourche River near Belle Fourche, S. Dak., in 1912.

Date.	Hydrographer.	Gage height.	Discharge.
Apr. 5	F. J. Barnes.....	<i>Feet.</i> 4.65	<i>Sec.-feet.</i> 3,420
8	do.....	10.60	10,500

Daily discharge, in second-feet, of Belle Fourche River near Belle Fourche, S. Dak., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1.....	105	140	160	600	1,460	350	150	170	425	960	225	207
2.....	105	140	160	2,280	1,460	250	250	340	425	810	225	207
3.....	105	150	160	2,620	1,460	200	200	615	425	650	200	207
4.....	105	160	160	2,120	1,460	200	250	589	425	400	200	207
5.....	105	170	160	3,580	1,460	200	290	340	395	400	175	207
6.....	105	180	160	5,460	1,720	200	250	793	395	400	175	208
7.....	105	190	160	7,590	2,220	200	300	789	375	400	180	208
8.....	105	190	160	11,480	2,455	200	350	1,255	375	400	180	208
9.....	105	200	160	9,300	2,065	200	270	605	405	400	180	208
10.....	105	220	160	5,815	1,720	200	270	450	240	550	180	208
11.....	105	240	160	5,130	1,720	200	270	340	310	550	190	207
12.....	110	240	160	4,230	1,460	200	270	320	280	370	190	207
13.....	110	240	160	5,555	1,250	225	270	280	400	340	190	207
14.....	110	240	160	3,000	1,250	250	270	280	310	340	190	207
15.....	110	260	160	2,590	1,040	275	175	250	360	325	200	207
16.....	105	280	160	2,220	1,000	300	175	250	440	325	200	208
17.....	105	290	160	1,720	850	350	175	2,190	446	295	210	208
18.....	105	290	160	1,460	500	200	175	6,320	380	295	210	208
19.....	105	290	160	2,090	600	175	175	2,805	310	260	210	208
20.....	105	300	160	3,440	600	150	175	2,200	310	260	210	208
21.....	110	310	160	3,870	1,120	150	175	1,940	310	260	200	212
22.....	115	320	160	3,130	1,395	150	150	1,485	310	260	200	212
23.....	120	330	160	2,460	600	150	175	1,145	310	325	200	213
24.....	125	340	160	1,940	600	150	175	818	1,040	245	200	213
25.....	125	340	160	1,940	550	150	150	636	820	260	200	260
26.....	130	290	200	1,720	500	150	100	566	470	260	220	260
27.....	130	240	1,070	1,720	475	150	100	492	380	260	200	260
28.....	130	240	1,150	1,720	450	150	100	412	410	260	220	260
29.....	130	180	1,550	1,720	425	150	100	414	410	260	220	260
30.....	130	1,030	1,460	400	150	100	414	960	260	220	260
31.....	135	600	375	100	414	270	260

Monthly discharge of Belle Fourche River near Belle Fourche, S. Dak., for 1912.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
January.....	135	105	113	6,950
February.....	340	140	242	13,900
March.....	1,550	160	303	18,600
April.....	11,500	600	3,470	206,000
May.....	2,460	375	1,120	68,900
June.....	350	150	201	12,000
July.....	350	100	198	12,200
August.....	6,320	170	978	60,100
September.....	1,040	240	418	24,900
October.....	960	245	376	23,100
November.....	225	180	200	11,900
December.....	260	207	220	13,500
The year	11,500	100	652	472,000

NOTE.—The above records have been changed slightly from the records of the United States Reclamation Service to conform with the computing rules of the United States Geological Survey.

WHITE RIVER BASIN.

WHITE RIVER NEAR INTERIOR, S. DAK.

Location.—At the steel highway bridge near the southwest corner of sec. 7, T. 4 S., R. 18 E., where the county line between Stanley and Pennington counties intersects White River, 3 miles southwest of Interior, S. Dak., a station on the Chicago, Milwaukee & St. Paul Railway.

Records available.—June 24, 1904, to November 30, 1906, at old station in T. 3 S., R. 18 E.; August 24, 1911, to December 31, 1912.

Drainage area.—4,090 square miles. The area above the present site is about 15 square miles less than the area above the station maintained during 1904–1906, near Westover.

Gage.—A vertical rod attached to the lower side of the first pier (nearest the shore) at the left end of the bridge, installed August 31, 1911, and supposed to read the same as the temporary rod gage which was placed August 24 on a tree on the left bank at the turn of the river near the southwest corner of NW. $\frac{1}{4}$ sec. 17.

Channel.—Probably changes gradually; bed composed of sand and some quicksand; left bank steep and clean; right bank gently sloping and clean; current, medium. At low stages all the water may pass under one span (67-foot); at the highest stage the water passes under two 67-foot spans and 120 feet of trestle approach, but probably two-thirds of the flow passes under the two spans.

Discharge measurements.—Made from the highway bridge.

Winter flow.—Probably affected by ice.

Accuracy.—Results fair after July 1.

Discharge measurements of White River near Interior, S. Dak., in 1912.

Date.	Hydrographer.	Gage height.	Dis-charge.	Date.	Hydrographer.	Gage height.	Dis-charge.
Apr. 9	G. Monley.....	<i>Feet.</i> 4.45	<i>Sec.-ft.</i> 348	Sept. 8	E. F. Chandler.....	<i>Feet.</i> 3.33	<i>Sec.-ft.</i> 7.4
June 28	E. F. Chandler.....	3.32	27.6	Oct. 26	W. B. Stevenson.....	3.65	49.6
29	do.....	3.30	22.1				

Daily gage height, in feet, of White River near Interior, S. Dak., for 1912.

[H. Thompson, observer.]

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1.....		6.3	6.6	3.8	4.1	3.8	3.4	3.7	3.9	3.9
2.....		6.4	4.8	3.8	3.9	3.6	3.4	3.7	3.9	3.9
3.....		6.5	5.0	3.8	5.0	3.7	4.2	3.8	3.9	3.9
4.....		6.65	5.1	3.85	8.0	4.6	3.8	3.8	3.9	3.9
5.....		5.1	4.8	3.8	7.8	5.2	3.8	3.7	3.9	3.9
6.....		4.8	5.1	3.7	6.8	4.8	3.7	3.7	3.9	3.9
7.....		4.6	4.8	3.7	6.1	4.7	3.7	3.6	3.9	3.9
8.....		4.65	4.6	3.7	5.4	4.6	3.7	3.8	3.9	3.9
9.....		4.5	4.4	3.8	5.3	4.0	3.7	3.8	3.9	3.9
10.....		4.5	4.3	3.8	5.1	4.2	3.6	3.7	3.8	3.9
11.....		4.5	4.2	3.8	4.6	4.4	3.7	3.7	3.8	3.9
12.....		4.5	4.1	3.85	4.1	4.0	3.8	3.6	3.9	3.9
13.....		4.4	4.05	3.85	3.9	3.6	3.9	3.7	3.9	3.9
14.....		6.4	4.1	3.85	3.6	3.1	3.8	3.7	3.9	3.9
15.....		5.4	4.2	3.8	3.6	3.0	3.8	3.7	4.0	4.0
16.....		5.2	4.2	4.7	3.6	6.1	3.7	3.7	3.9	4.0
17.....	10.5	5.0	4.2	4.6	4.0	4.5	3.9	3.6	3.8	4.0
18.....	10.85	4.6	4.2	3.2	4.0	4.0	3.7	3.6	3.8	4.0
19.....	10.7	4.5	4.25	3.2	3.8	5.95	3.6	3.6	3.8	4.0
20.....	10.9	4.4	4.2	3.2	5.2	4.6	3.5	3.6	3.9	4.0

Daily gage height, in feet, of White River near Interior, S. Dak., for 1912—Continued.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
21.....	9.0	4.6	4.2	3.2	4.6	4.4	3.5	3.6	3.9	4.0
22.....	9.9	4.8	4.2	3.2	4.2	4.2	3.5	3.6	3.8	4.0
23.....	8.0	5.6	4.25	2.9	3.8	4.0	3.5	3.6	3.8	4.0
24.....	8.2	6.4	4.25	3.1	3.8	3.8	3.8	3.6	3.8	4.0
25.....	8.65	5.4	4.3	3.2	3.7	3.7	4.3	3.6	3.8	4.0
26.....	7.9	5.4	4.2	3.3	3.7	3.7	4.2	3.6	3.8	4.0
27.....	7.0	5.0	4.2	3.3	5.0	3.6	4.0	3.7	3.9	4.0
28.....	7.25	5.4	4.2	3.3	4.6	3.6	3.9	3.7	3.9	4.0
29.....	7.75	4.8	4.25	3.3	4.4	3.5	3.9	3.7	3.9	4.1
30.....	6.0	6.6	3.8	3.35	4.2	3.5	3.8	3.8	3.8	4.1
31.....	6.3	3.8	4.0	3.5	3.9	4.1

NOTE.—Gage heights prior to July 1 subject to inaccuracies due to sudden changes in stage and to the fact that observer during that period lived some distance from gage. Relation of gage height to discharge affected by ice Mar. 17-31 and Nov. 27 to Dec. 31.

Daily discharge, in second-feet, of White River near Interior, S. Dak., for 1912.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1.....	1,790	2,290	75	165	75	26	55	100	75
2.....	1,950	440	75	100	42	26	55	100	75
3.....	2,120	530	75	530	55	200	75	100	75
4.....	2,375	580	87	4,720	360	75	75	100	75
5.....	580	440	75	4,360	635	75	55	100	75
6.....	440	580	55	2,630	440	55	55	100	55
7.....	360	440	55	1,500	400	55	42	100	55
8.....	380	360	55	770	360	55	75	100	55
9.....	320	280	75	700	130	55	75	100	55
10.....	320	240	75	580	200	42	55	75	55
11.....	320	200	75	360	280	55	55	75	55
12.....	320	165	87	165	130	75	42	100	55
13.....	280	148	87	100	42	100	55	100	55
14.....	1,950	165	87	42	13	75	55	100	55
15.....	770	200	75	42	10	75	55	130	75
16.....	635	200	400	42	1,500	55	55	100	75
17.....	530	200	360	130	320	100	42	75	55
18.....	360	200	16	130	130	55	42	75	55
19.....	320	220	16	75	1,310	42	42	75	55
20.....	280	200	16	635	360	33	42	100	55
21.....	360	200	16	360	280	33	42	100	55
22.....	440	200	16	200	200	33	42	75	55
23.....	940	220	7	75	130	33	42	75	55
24.....	1,950	220	13	75	75	75	42	75	55
25.....	770	240	16	55	55	240	42	75	55
26.....	770	200	20	55	55	200	42	75	42
27.....	530	200	20	530	42	130	55	75	42
28.....	770	200	20	360	42	100	55	75	42
29.....	440	220	20	280	33	100	55	75	42
30.....	2,290	75	23	200	33	75	75	55	42
31.....	75	130	33	100	42

NOTE.—Discharges determined from a curve fairly well defined between 30 and 6,500 second-feet.

Monthly discharge of White River near Interior, S. Dak., for 1912.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accu- racy.
	Maximum.	Minimum.	Mean.		
April.....	2,380	280	855	50,900	D.
May.....	2,290	75	327	20,100	D.
June.....	400	7	69.7	4,150	D.
July.....	4,720	42	648	39,800	B.
August.....	1,500	10	251	15,400	B.
September.....	240	25	78.3	4,660	B.
October.....	100	42	54.6	3,360	C.
November.....	130	55	88.7	5,230	C.
December.....	75	42	57.0	3,500	D.
The period.....	147,000

WHITE RIVER AT WESTOVER, S. DAK.

Location.—Until April 7, 1912, near the east side of sec. 32, T. 3 S., R. 29 E., 12 miles south and slightly east from Murdo, S. Dak., a station on the Chicago, Milwaukee & St. Paul Railway; about 1 mile below entrance of Little White River; on and after April 8, at steel highway bridge about 40 rods above the old station.

Records available.—August 25, 1911, to December 31, 1912.

Drainage area.—Not measured.

Gage.—Standard chain gage on steel highway bridge. Zero of gage is 2.0 feet higher than zero of original gage installed in 1911.

Channel.—Composed of sand and silt; likely to scour and fill at flood stages.

Discharge measurements.—Made from highway bridge.

Winter flow.—Affected by ice.

Accuracy.—Results poor owing to infrequency of gage heights and measurements and to the shifting character of channel.

Discharge measurements White River at Westover, S. Dak., in 1912.

Date.	Hydrographer.	Gage height.	Dis-charge.	Date.	Hydrographer.	Gage height.	Dis-charge.
		<i>Feet.</i>	<i>Sec.-ft.</i>			<i>Feet.</i>	<i>Sec.-ft.</i>
Apr. 10	G. Monley.....	7.20	663	Sept. 7	E. F. Chandler.....	7.12	320
June 26	E. F. Chandler.....	6.48	164	Oct. 24	W. B. Stevenson.....	6.69	133
Sept. 6do.....	7.60	644				

Daily gage height, in feet, of White River at Westover, S. Dak., for 1912.

(Mrs. J. E. Rawhouser, observer.)

Day.	Mar.	Apr.	June.	July.	Aug.	Sept.	Oct.	Nov.
1.....		7.5		7.0	6.3			7.2
2.....		7.5		8.0		6.5	7.3	
3.....		7.5				6.0		
4.....		7.5		9.1				7.4
5.....		7.4		10.1				
6.....		7.45		9.7		7.6		7.4
7.....		7.2				7.1	5.4	
8.....		7.2			7.0			
9.....		7.2						7.2
10.....		7.2				5.4		
11.....		7.0						5.3
12.....		7.0						
13.....		7.0						
14.....		7.0					7.4	
15.....		7.0			6.2			7.5
16.....		8.5				6.5	7.3	
17.....		8.0					7.1	7.5
18.....		8.0			9.2	7.0		
19.....		7.0						
20.....		7.0					7.0	7.4
21.....		8.8			9.0			
22.....		8.7			8.1			
23.....		8.6			7.0	6.3	6.2	
24.....		8.5	6.4		6.7			
25.....	10.0		6.3				7.0	
26.....	9.0	8.2	6.5		6.6			
27.....	8.0	8.1		6.4				
28.....	7.0	8.0		6.3			6.2	
29.....	7.0			6.5				
30.....	6.5			6.6		6.6		
31.....	6.5						7.3	

Daily discharge, in second-feet, of White River at Westover, S. Dak., for 1912.

Day.	Mar.	Apr.	June.	July.	Aug.	Sept.	Oct.	Nov.
1.....		525		310	131	170	430	387
2.....		525		840	150	170	430	387
3.....		525		1,320	170	80	300	476
4.....		525		2,272	200	80	200	476
5.....		476		4,900	230	578	120	476
6.....		500		3,718	260	578	60	476
7.....		387		2,500	300	347	11	476
8.....		387		1,200	310	347	60	387
9.....		387		400	300	11	115	387
10.....		387		300	260	11	175	200
11.....		310		250	230	30	250	4
12.....		310		200	200	50	325	100
13.....		310		150	170	80	400	200
14.....		310		150	140	110	476	350
15.....		310		150	113	140	450	525
16.....		1,320		150	113	170	430	525
17.....		840		150	2,478	240	347	525
18.....		840		150	2,478	310	347	525
19.....		310		150	2,350	310	310	476
20.....		310		150	2,200	240	310	476
21.....		1,740		150	2,080	180	310
22.....		1,588		150	918	131	131
23.....		1,448		150	310	131	131
24.....		1,320	150	150	217	135	220
25.....	4,600	1,160	131	150	205	142	310
26.....	2,080	1,004	170	150	190	150	310
27.....	840	918		150	190	160	113
28.....	310	840		150	190	170	113
29.....	310	840		170	180	180	113
30.....	170	840		190	170	192	430
31.....	170			160	170		430

NOTE.—Daily discharge determined from a fairly well-defined curve. Discharge interpolated for day or which gage heights are missing.

Monthly discharge of White River at Westover, S. Dak., for 1912.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accu- racy.
	Maximum.	Minimum.	Mean.		
March.....	4,600	170	1,210	16,800	C.
April.....	1,740	310	716	42,600	C.
July.....	4,900	150	631	41,900	D.
August.....	2,478	113	568	34,900	D.
September.....	578	11	187	11,100	D.
October.....	476	11	263	16,200	D.
November.....	525	4	392	15,600	D.

LITTLE WHITE RIVER NEAR WESTOVER, S. DAK.

Location.—At C. H. Kendall's ranch, about 4 miles south of Westover, and about 2 miles above the mouth of the stream.

Records available.—June 26 to December 31, 1912.

Drainage.—Not measured.

Gage.—Staff about 30 rods below cable.

Channel.—Sandy and shifting.

Winter flow.—Conditions unknown.

Accuracy.—Owing to location of gage during 1912, at a very shifting section, gage heights rather uncertain.

Measurements insufficient for estimates of discharge.

Discharge measurements of Little White River near Westover, S. Dak., in 1912.

Date.	Hydrographer.	Gage height.	Discharge.
		<i>Feet.</i>	<i>Sec.-ft.</i>
June 27	E. F. Chandler.....	2.00	86.6
Sept. 7	do.....	1.92	35.5
Oct. 25	W. B. Stevenson.....	1.95	119

Daily gage height, in feet, of Little White River near Westover, S. Dak., for 1912.

[Mrs. C. H. Kendall, observer.]

Day.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1.....		2.0		1.95	1.95	2.0	1.9
2.....		2.0		1.95	1.95	2.0	
3.....		2.0			1.95	1.95	2.0
4.....		2.0			1.95	1.95	
5.....		2.0	2.0		1.95		2.0
6.....		2.0	2.0		1.95	2.0	2.3
7.....		2.0		1.95	1.95	2.0	2.3
8.....		2.15			1.95	1.95	
9.....				1.95	1.95	1.95	2.3
10.....		2.0		1.95	1.95	1.9	
11.....				1.95	1.95	1.9	1.95
12.....		2.0	2.0	1.95	1.95	1.9	1.95
13.....		2.0		1.95	1.95	1.9	
14.....			2.0	1.95	1.95	1.9	1.95
15.....		2.0			1.95	1.9	
16.....		2.0	2.0	1.95	1.95	1.9	2.0
17.....		2.0	1.95	1.95	1.95	1.95	
18.....				1.95			
19.....		2.0	1.95	1.95	1.95	1.95	2.0
20.....		2.0	1.95	1.95	1.90	2.0	1.95
21.....		2.0	1.95	1.95	1.90	2.2	1.95
22.....		2.0	1.95	1.95	1.90	2.2	2.2
23.....		2.0	1.95	1.95	1.92	2.2	
24.....		2.0	1.95		1.92	2.0	2.4
25.....			1.95	1.95	1.95		2.4
26.....	2.0	2.0	1.95	1.95	1.95	2.0	2.4
27.....	2.0	2.0	1.95	1.95		1.9	
28.....	2.0	2.0	1.95	1.95	1.90		2.4
29.....	2.0		1.95		1.90	1.9	2.4
30.....	2.0	2.0	1.95	1.95	1.90	1.9	2.4
31.....		2.0	1.95	1.95	1.90		2.4

NOTE.—Gage heights subject to inaccuracies due to location of gage at a very shifting section.

NIOBRARA RIVER BASIN.

NIOBRARA RIVER AT NIOBRARA, NEBR.

Location.—At the Government highway bridge spanning the main channel in SE. $\frac{1}{4}$ sec. 18, T. 32 N., R. 56 W., half a mile from the depot at Niobrara, $1\frac{1}{2}$ miles above the mouth. No tributaries enter below.

Records available.—August 19, 1910, to December 23, 1912. From May 11, 1902, to October 25, 1902, a station was maintained at a highway bridge 1 mile southwest of Niobrara.

Drainage area.—Not measured.

Gage.—Vertical staff.

Channel.—Extremely shifting. Possibly within the influence of backwater from Missouri River.

Discharge measurements.—Made from bridge.

Winter flow.—During the winter months ice causes backwater for short periods.

Diversions.—Prior to September 1, 1912, there were approved diversions of 561 second-feet for irrigation and 2,755 second-feet for power from Niobrara River above the station. There are also approved diversions of 180 second-feet for irrigation and 453 second-feet for power from tributaries entering above. In Wyoming there are adjudicated diversions of 24 second-feet from the Niobrara and tributaries.

Accuracy.—Owing to the shifting channel and insufficient discharge measurements no estimates of discharge have been made.

Cooperation.—Station maintained in cooperation with the State engineer, by whom the field data are furnished.

Discharge measurements of Niobrara River at Niobrara, Nebr., in 1912.

Date.	Hydrographer.	Gage height.	Dis-charge.	Date.	Hydrographer.	Gage height.	Dis-charge.
		<i>Feet.</i>	<i>Sec.-ft.</i>			<i>Feet.</i>	<i>Sec.-ft.</i>
Apr. 27	C. G. Hrubesky	1.8	3,400	Aug. 22	D. P. Weeks, jr.	1.1	1,230
May 5	A. B. Price	1.9	2,680	Sept. 23do.....	1.1	2,110
May 24	H. W. Roberts	1.8	2,020	Oct. 28do.....	1.8	1,840
June 20	D. P. Weeks, jr.	2.1	1,600	Nov. 30do.....	0.9	2,390
July 25do.....	1.9	1,280				

Daily gage height, in feet, of Niobrara River at Niobrara, Nebr., for 1912.

[A. T. Reid, observer.]

Day.	Apr.	May.	June	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1.....	1.5	1.7	1.7	2.0	2.0	1.5	1.1	1.0	0.8
2.....	1.6	1.8	2.0	2.2	2.0	1.6	1.1	.7	.8
3.....	2.0	1.7	2.0	2.2	2.0	1.5	1.1	1.3	.8
4.....	1.4	1.8	1.9	2.3	2.2	1.5	1.0	1.5	.9
5.....	1.3	1.8	2.0	2.2	2.0	1.4	1.0	1.5	1.0
6.....	1.3	1.9	2.1	2.2	2.0	1.3	1.1	1.7	.9
7.....	1.4	1.8	2.0	2.2	2.0	1.5	1.2	1.5	.8
8.....	1.3	1.7	2.0	2.1	2.0	1.4	1.1	1.2	.8
9.....	1.3	1.7	2.1	2.3	2.0	1.4	1.1	1.3	1.1
10.....	1.4	1.7	2.2	2.2	2.0	1.5	1.1	1.2	1.5
11.....	1.4	2.0	2.2	2.2	2.0	1.6	1.4	1.3	1.4
12.....	1.4	1.9	2.1	2.2	2.0	1.6	1.3	1.4	1.1
13.....	2.0	1.7	2.1	2.2	2.0	1.5	1.3	1.4	.9
14.....	1.7	1.6	2.2	2.2	2.1	1.5	1.0	1.3	1.0
15.....	1.8	1.5	2.2	2.1	1.8	1.6	1.0	1.2	1.1
16.....	1.7	1.5	2.1	2.2	1.6	1.6	1.1	1.3	.9
17.....	1.4	1.6	2.2	2.2	1.8	1.5	1.1	1.4	.4
18.....	1.4	1.7	2.2	2.2	2.0	1.4	1.3	1.1	1.0
19.....	1.4	1.7	2.2	2.3	1.9	1.3	1.1	.8	1.1
20.....	1.5	1.7	2.1	2.2	1.6	1.3	1.1	.9	.9
21.....	1.7	1.6	2.2	2.1	1.6	1.2	1.1	1.2	.9
22.....	1.8	1.7	2.2	2.0	1.5	1.0	1.3	1.0	.9
23.....	1.8	1.8	2.2	2.0	1.6	1.1	1.3	.9	.9
24.....	2.0	1.8	2.2	2.0	1.6	1.1	1.3	.9
25.....	1.9	1.7	2.2	2.0	1.5	1.0	1.4	.8
26.....	1.8	1.8	2.2	1.8	1.5	1.0	1.3	.8
27.....	1.8	1.7	2.3	1.9	1.5	1.1	1.3	1.0
28.....	1.8	1.6	2.2	2.2	1.5	1.1	1.3	.8
29.....	1.7	1.5	2.1	2.1	1.5	1.0	1.2	.8
30.....	1.7	1.6	2.1	2.0	1.6	1.1	1.2	.8
31.....	1.6	2.0	1.5	1.1

NOTE.—Gage heights Dec. 9-12 affected by ice.

BIG SIOUX RIVER BASIN.

ROCK RIVER AT LUVERNE, MINN.

Location.—At the Rock Island Railroad bridge at Luverne, Minn. Nearest tributary, Elk Creek, enters about 3 miles south of Luverne, Minn.

Records available.—August 23, 1911, to December 31, 1912.

Gage.—Vertical staff gage; datum unchanged.

Channel.—Shifting at high stages; probably permanent at low stages.

Winter flow.—Winter estimates 1911-12 have been based on observer's reports, climatologic data, and comparisons of flow of streams in drainage basins to the north and east.

Artificial control.—No dams above the station used for power development.

Accuracy.—Discharge curve is not well defined; records can not be considered better than fair.

Discharge measurements of Rock River at Luverne, Minn., in 1912.

Date.	Hydrographer.	Gage height.	Dis-charge.	Date.	Hydrographer.	Gage height.	Dis-charge.
		<i>Feet.</i>	<i>Sec.-ft.</i>			<i>Feet.</i>	<i>Sec.-ft.</i>
Mar. 21 ^a	S. B. Soulé.....	2.18	44.2	Sept. 8	S. B. Soulé.....	1.68	11.9
Apr. 1	W. G. Hoyt.....	3.62	259	8do.....	1.68	13.6
1do.....	3.83	324	8do.....	1.67	13.1

^a Very little ice present in main channel. Relation of gage height to discharge probably only slightly affected.

Daily gage height, in feet, of Rock River at Luverne, Minn., for 1912.

[C. W. Pinkerton, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1.	1.70	1.50	2.7	3.8	2.6	2.1	1.64	1.54	2.0	1.70	1.60	1.62
2.			2.6	3.5	2.55	2.0	1.60	1.54	2.1	1.70	1.60	1.64
3.			2.3	3.1	2.35	2.0	1.62	1.52	1.92	1.70	1.60	1.64
4.	1.70		2.3	2.95	2.4	1.95	1.68	1.52	1.90	1.70	1.60	1.60
5.		1.50	2.3	2.75	2.9	1.95	1.80	1.52	1.80	1.65	1.60	1.60
6.			2.2	2.65	2.9	1.90	1.62	1.52	1.70	1.62	1.60	1.60
7.			2.2	2.55	2.8	1.85	1.60	1.52	1.70	1.60	1.62	
8.	1.60	1.60	2.0	2.5	2.7	1.85	1.62	1.54	1.62	1.60	1.62	
9.			2.0	2.45	2.5	1.80	1.62	1.54	1.64	1.60	1.62	
10.			1.90	2.4	2.5	1.80	1.64	1.52	1.60	1.60	1.60	
11.	1.20		1.90	2.35	2.65	1.80	1.60	1.52	1.60	1.70	1.60	
12.		1.50	1.90	2.3	2.75	1.85	1.60	1.58	1.58	1.75	1.62	
13.			2.0	2.05	2.9	1.90	1.60	1.58	1.52	1.85	1.65	
14.			1.90	2.45	2.7	1.90	1.58	1.58	1.52	1.80	1.65	
15.	1.70	1.50	1.90	2.65	2.55	1.95	1.52	1.58	1.52	1.75	1.62	
16.		1.50	1.80	2.9	2.45	1.90	1.52	1.58	1.58	1.70	1.62	
17.		1.50	1.80	2.65	2.45	1.90	1.52	1.60	1.58	1.70	1.60	
18.	1.70	2.3	2.6	2.55	2.3	1.85	1.52	1.60	1.60	1.60	1.60	
19.		3.1	2.7	2.45	2.25	1.80	1.60	1.90	1.60	1.65	1.62	
20.		2.90	2.4	2.35	2.35	1.80	1.62	2.3	1.58	1.70	1.62	
21.		3.70	2.1	2.5	3.1	1.85	1.68	2.6	1.52	1.70	1.62	
22.		1.60	4.0	2.0	2.65	2.7	1.80	1.68	2.4	1.60	1.68	
23.			3.9	2.0	2.85	2.5	1.78	1.62	2.1	1.60	1.68	
24.			3.9	2.1	2.75	2.3	1.75	1.64	1.90	1.58	1.65	
25.		1.60	3.6	2.6	2.55	2.25	1.75	1.64	1.82	1.52	1.65	
26.			3.3	2.8	2.7	2.3	1.70	1.60	1.80	1.80	1.62	
27.			3.1	2.75	2.9	2.2	1.65	1.64	1.74	1.80	1.62	
28.			2.9	3.05	3.1	2.2	1.65	1.64	1.70	1.72	1.60	
29.		1.60	2.9	3.6	3.2	2.15	1.65	1.60	1.70	1.72	1.60	
30.				4.1	2.8	2.15	1.64	1.60	1.72	1.74	1.60	
31.			4.0		2.1		1.52	1.92		1.60		

NOTE.—Relation of gage height to discharge affected by ice Jan. 1 to about Feb. 17 and about Dec. 7-31.

Daily discharge, in second-feet, of Rock River at Luverne, Minn., for 1912.

Day.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1.....		104	306	92	40	12	8.8	32	14	10	11
2.....		92	245	86	32	10	8.8	40	14	10	12
3.....		59	167	64	32	11	8.4	26	14	10	12
4.....		59	142	69	28	13	8.4	25	14	10	10
5.....		59	111	134	28	19	8.4	19	12	10	10
6.....		49	98	134	25	11	8.4	14	11	10	10
7.....		49	86	118	22	10	8.4	14	10	11
8.....		32	80	104	22	11	8.8	11	10	11
9.....		32	74	80	19	11	8.8	12	10	11
10.....		25	69	80	19	12	8.4	10	10	10
11.....		25	64	98	19	10	8.4	10	14	10
12.....		25	59	111	22	10	9.6	9.6	16	11
13.....		32	36	134	25	10	9.6	8.4	22	12
14.....		25	74	104	25	9.6	9.6	8.4	19	12
15.....		25	98	86	28	8.4	9.6	8.4	16	11
16.....		19	134	74	25	8.4	9.6	9.6	14	11
17.....		19	98	74	25	8.4	10	9.6	14	10
18.....	59	92	86	59	22	8.4	10	10	13	10
19.....	167	104	74	54	19	10	25	10	12	11
20.....	134	69	64	64	19	11	59	9.6	14	11
21.....	285	40	80	167	22	13	92	8.4	14	11
22.....	350	32	98	104	19	13	69	10	13	11
23.....	328	32	126	80	18	11	40	10	13	12
24.....	328	40	111	59	16	12	25	9.6	12	10
25.....	265	92	86	54	16	12	20	8.4	12	10
26.....	205	118	104	59	14	10	19	19	11	10
27.....	167	111	134	49	12	12	16	19	11	10
28.....	134	158	167	49	12	12	14	15	10	10
29.....	134	265	185	44	12	10	14	15	10	10
30.....		372	118	44	12	10	15	16	10	10
31.....		350	40	8.4	26	10

NOTE.—Daily discharge computed from a fairly well-defined curve. Discharge Jan. 1 to Feb. 18 and Dec. 7-31, 1912, estimated as follows, because of ice, from observer's reports, climatologic records, and discharge of drainage areas to the north and east: Jan. 1-21, 2 second-feet; Feb. 1-17, 6 second-feet; Dec. 7-31, 7 second-feet.

Monthly discharge of Rock River at Luverne, Minn., for 1912.

[Drainage area, 440 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accu- racy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January.....	2.0	0.0046	0.005	D.
February.....	350	91.7	.208	.22	C.
March.....	372	19	84.0	.191	.22	B.
April.....	306	36	112	.255	.28	B.
May.....	167	40	82.8	.188	.22	B.
June.....	40	12	21.6	.049	.05	C.
July.....	19	8.4	10.9	.025	.03	C.
August.....	92	8.4	19.2	.044	.05	C.
September.....	40	8.4	14.2	.032	.04	C.
October.....	22	10	12.9	.029	.03	C.
November.....	12	10	10.5	.024	.03	C.
December.....	12	7.74	.018	.02	D.
The year.....	372	38.9	.088	1.20

NOTE.—See footnotes to tables of daily gage height and daily discharge.

PLATTE RIVER BASIN.

NORTH PLATTE RIVER AT SARATOGA, WYO.

Location.—At highway bridge in Saratoga, 2 miles below the mouth of Spring Creek.

Records available.—June 9, 1903, to October 31, 1906; April 1, 1909, to December 17, 1909; April 27, 1911, to October 31, 1912.

Drainage area.—2,920 square miles (measured from Land Office map).

Gage.—A chain gage was installed at the bridge in 1911. The original gage was a vertical staff located 100 yards below the bridge. The relation between the two gages has not been determined.

Channel.—Practically permanent, except that the tie drives may cause backwater for a few days.

Discharge measurements.—Made from bridge.

Winter flow.—Ice causes backwater during the winter months and discharge measurements are made to determine the approximate flow.

Diversions.—Prior to July 1, 1912, there were adjudicated diversions of 86 second-feet from the North Platte above Saratoga in Wyoming and 934 second-feet from tributaries entering above. In the Colorado portion of the drainage basin there are adjudicated decrees for diversions of 3,060 second-feet from the headwaters of the North Platte, of which 121 second-feet are for diversion to Cocks la Poudre River.

Accuracy.—Conditions are favorable for accurate results and the estimates should be reliable.

Discharge measurements North Platte River at Saratoga, Wyo., in 1912.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		<i>Feet.</i>	<i>Sec.-ft.</i>			<i>Feet.</i>	<i>Sec.-ft.</i>
Jan. 29 ^a	R. H. Fletcher	3.91	266	July 14	R. H. Fletcher	6.33	3,570
Mar. 19 ^b	do	3.88	366	Aug. 22	do	4.22	567
June 4	do	3.98	11,200	Oct. 18	do	4.35	634

^a Measurement from railroad bridge about one-fourth mile upstream from gage. Channel open at measuring section, at gage, and at control. No apparent effect of ice on relation of gage height to discharge.

^b Measurement at regular section at wagon bridge. Channel open. No apparent effect of ice on gage height.

Daily gage height, in feet, of North Platte River at Saratoga, Wyo., for 1912.

[Garret Price, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
1.				4.26	4.8	8.3	7.8	5.6	4.24	4.26
2.				4.28	5.4	8.4	7.4	5.5	4.18	4.28
3.				4.44	5.6	8.8	7.1	5.35	4.14	4.28
4.				4.54	5.55	9.1	6.8	5.1	4.05	4.24
5.			3.82	4.65	5.3	9.2	7.0	4.97	3.96	4.24
6.				4.75	5.0	9.2	6.7	4.87	3.96	4.41
7.				4.48	4.86	9.3	6.5	4.83	3.94	4.46
8.		3.93		4.66	5.15	9.3	6.4	4.83	3.91	4.45
9.				4.9	5.6	9.4	6.2	4.78	3.96	4.48
10.			3.83	5.1	5.9	9.2	6.1	4.64	4.21	4.51
11.				5.0	5.8	9.1	6.1	4.56	4.18	4.51
12.		3.88		5.0	5.6	8.7	6.0	4.5	4.21	4.48
13.				5.1	5.5	8.7	6.1	4.42	4.16	4.44
14.			3.78	4.92	5.3	8.4	6.4	4.37	4.24	4.34
15.				4.78	5.2	8.1	6.3	4.38	4.26	4.34
16.				4.67	5.15	7.6	6.1	4.42	4.32	4.31
17.		4.03		4.78	5.5	7.3	5.8	4.4	4.42	4.31
18.			3.88	5.0	6.1	6.9	5.7	4.4	4.51	4.32
19.			3.98	5.15	6.8	6.7	5.6	4.38	4.61	4.3
20.			4.19	5.4	6.9	6.6	5.8	4.29	4.61	4.47
21.			4.16	5.1	7.3	6.7	5.7	4.26	4.54	4.38
22.		3.86	4.06	4.88	7.5	6.7	5.6	4.18	4.4	4.41
23.			4.02	4.77	7.6	7.0	5.45	4.18	4.35	4.42
24.			4.18	4.69	7.8	7.3	5.35	4.16	4.28	4.45
25.			4.3	4.86	7.9	7.6	5.25	4.16	4.46	4.48
26.			3.95	4.9	8.0	7.6	5.25	4.16	4.4	4.46
27.			3.95	4.95	8.0	7.7	5.4	4.1	4.38	4.48
28.		3.81	4.0	5.0	7.6	7.8	5.4	4.06	4.36	4.49
29.	3.91		4.27	4.98	7.8	7.7	5.4	4.08	4.36	4.5
30.			4.22	5.15	8.0	7.9	5.4	4.3	4.34	4.5
31.			4.4		8.5		5.6	4.41		4.44

NOTE.—Gage heights Jan. 1 to Mar. 17 affected by ice.

Daily discharge, in second-feet, of North Platte River at Saratoga, Wyo., for 1912.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
1.....		593	1,080	8,860	7,300	2,250	582	593
2.....		604	1,920	9,180	6,180	2,080	549	604
3.....		707	2,250	10,500	5,410	1,850	527	604
4.....		795	2,160	11,500	4,680	1,480	478	582
5.....		910	1,780	11,900	5,160	1,310	430	582
6.....		1,020	1,340	11,900	4,450	1,180	430	683
7.....		738	1,160	12,200	4,000	1,120	420	723
8.....		921	1,560	12,200	3,780	1,120	405	715
9.....		1,220	2,250	12,600	3,360	1,060	430	739
10.....		1,480	2,780	11,900	3,160	899	566	765
11.....		1,340	2,600	11,500	3,160	815	549	765
12.....		1,340	2,250	10,200	2,970	755	566	739
13.....		1,480	2,080	10,200	3,160	691	538	707
14.....		1,240	1,780	9,180	3,780	687	582	639
15.....		1,060	1,620	8,220	3,570	663	593	639
16.....		932	1,560	6,730	3,160	691	627	621
17.....		1,000	2,080	5,920	2,600	675	691	621
18.....	350	1,340	3,160	4,920	2,420	675	765	627
19.....	366	1,560	4,680	4,450	2,250	663	866	615
20.....	405	1,920	4,920	4,220	2,600	610	866	731
21.....	444	1,480	5,920	4,450	2,420	593	795	663
22.....	483	1,190	6,450	4,450	2,250	549	675	683
23.....	461	1,050	6,730	5,160	2,000	549	645	691
24.....	549	954	7,300	5,920	1,850	538	604	715
25.....	615	1,160	7,000	6,730	1,700	538	723	739
26.....	425	1,220	7,900	6,730	1,700	538	675	723
27.....	425	1,280	7,900	7,010	1,920	505	663	739
28.....	450	1,340	6,730	7,300	1,920	483	651	747
29.....	598	1,320	7,300	7,010	1,920	494	651	755
30.....	571	1,560	7,900	7,000	1,920	615	639	755
31.....	675		9,500		2,250	683		707

NOTE.—Discharge determined from a well-defined rating curve. Discharge Mar. 1-17 estimated at 275 second-feet.

Monthly discharge of North Platte River at Saratoga, Wyo., for 1912.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accu- racy.
	Maximum.	Minimum.	Mean.		
February.....			a 250	14,400	D.
March.....	675		371	22,800	C.
April.....	1,920	593	1,160	69,000	B.
May.....	9,500	1,080	4,070	250,000	B.
June.....	12,600	4,220	8,350	497,000	B.
July.....	7,300	1,700	3,190	196,000	B.
August.....	2,250	483	882	54,200	B.
September.....	866	405	606	36,100	B.
October.....	765	582	684	42,100	B.
The period.....				1,180,000	

a Estimated.

NORTH PLATTE RIVER AT PATHFINDER, WYO.

Location.—One-third mile south of Pathfinder and 800 feet below the mouth of the canyon, in sec. 24, T. 29 N., R. 84 W. The nearest tributary is Canyon Creek, which enters 2 miles above.

Records available.—May 9, 1905, to December 31, 1912.

Drainage area.—About 12,000 square miles. (Measured from Land Office map.)

Gage.—Chain gage; datum unchanged.

Channel.—Condition not known, as only final results are furnished.

Discharge measurements.—Made from car and cable.

Winter flow.—Ice causes slight backwater for short periods.

Controlled flow.—The Pathfinder dam, one-fourth mile above the station, forms a reservoir of 1,025,000 acre-feet capacity. This reservoir materially changes the natural run-off of the river, as is seen by a comparison with the records of inflow.

Diversions.—Prior to July 1, 1912, there were adjudicated diversions of 58 second-feet from the North Platte between Saratoga and Pathfinder and diversions of 1,550 second-feet from intervening tributaries. Near Whalen, 150 miles below, the water from the Pathfinder reservoir is diverted by the Interstate Canal and used to irrigate land in Nebraska and Wyoming. Further canals are contemplated by the Reclamation Service.

Cooperation.—Station maintained and records furnished by United States Reclamation Service.

Discharge measurements of North Platte River at Pathfinder, Wyo., in 1912.

Date.	Hydrographer.	Gage height.	Discharge.
		<i>Feet.</i>	<i>Sec.-ft.</i>
Jan. 24 ^a	Comstock & Wright	1.52	311
Feb. 5 ^a	H. D. Comstock	— .67	b 100
Apr. 18do.....	— .41	b 50
June 18do.....	5.50	4,230

^a Ice.

^b Discharge estimated.

Daily gage height, in feet, of North Platte River at Pathfinder, Wyo., for 1912.

[T. Wright, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1.....	1.2	1.5	—0.7	—0.7	—0.4	3.8	5.1	6.8	6.45	6.1	5.9	1.7
2.....	1.2	1.5	— .7	— .7	— .4	3.8	5.1	6.75	6.45	6.05	5.55	1.7
3.....	1.6	1.55	— .7	— .7	— .4	3.8	5.15	6.75	6.45	6.05	5.3	1.65
4.....	1.2	1.7	— .7	— .7	— .4	4.65	5.15	6.75	6.45	6.0	5.05	1.65
5.....	1.5	— .7	— .7	— .7	2.7	4.65	4.8	6.75	6.45	6.0	4.7	1.7
6.....	1.3	1.75	— .7	— .7	2.5	5.15	6.15	6.75	6.45	5.95	4.4	1.7
7.....	2.0	1.5	— .7	— .7	2.5	5.25	5.5	6.75	6.4	5.9	4.35	1.7
8.....	1.5	— .7	— .7	— .7	2.5	5.3	5.5	6.75	6.4	5.85	4.2	1.7
9.....	1.85	— .7	— .7	— .7	2.5	5.35	5.5	6.7	6.4	5.85	4.0	1.7
10.....	1.8	— .7	— .7	— .7	2.5	5.4	6.15	6.7	6.4	5.8	3.55	1.7
11.....	1.75	— .7	— .7	— .4	2.55	5.45	6.75	6.7	6.35	5.8	2.7	1.7
12.....	1.8	— .7	— .7	— .4	2.55	5.45	6.7	6.7	6.35	5.75	2.75	1.7
13.....	1.75	— .7	— .7	— .4	2.55	5.45	6.7	6.65	6.35	5.75	—0.4	2.0
14.....	1.55	— .7	— .7	— .4	2.55	5.45	6.7	6.65	6.3	5.7	3.2	2.0
15.....	1.25	— .7	— .7	— .4	2.55	5.45	6.75	6.65	6.3	5.7	3.2	2.05
16.....	1.5	— .7	— .7	— .4	2.4	5.5	6.7	6.65	6.3	5.65	3.1	2.0
17.....	1.0	— .7	— .7	— .4	— .4	5.5	6.75	6.65	6.3	5.6	2.8	2.0
18.....	1.35	— .7	— .7	— .4	— .4	5.5	6.7	6.65	6.25	5.55	2.75	2.0
19.....	1.4	— .7	— .7	— .4	— .4	5.5	6.7	6.65	6.25	5.55	1.85	1.75
20.....	1.4	— .7	— .7	— .4	— .4	5.5	6.75	6.65	6.25	5.5	2.35	1.75
21.....	1.45	— .7	— .7	— .4	— .4	5.5	6.75	6.6	6.2	5.5	2.25	1.5
22.....	1.5	— .7	— .7	— .4	— .4	5.5	6.75	6.6	6.2	5.4	2.15	1.55
23.....	1.5	— .7	— .7	— .4	— .4	5.5	6.8	6.6	6.15	7.05	2.2	1.55
24.....	1.5	— .7	— .7	— .4	— .4	5.5	6.8	6.55	6.15	6.95	2.15	1.35
25.....	1.5	— .7	— .7	— .4	— .4	5.1	6.8	6.55	6.15	6.95	2.2	1.35
26.....	1.5	— .7	— .7	— .4	— .4	5.1	6.8	6.55	6.15	6.8	2.15	1.3
27.....	1.9	— .7	— .7	— .4	— .4	5.1	6.8	6.5	6.15	6.75	2.15	1.3
28.....	1.45	— .7	— .7	— .4	1.8	5.1	6.8	6.5	6.1	6.6	2.05	1.6
29.....	1.5	— .7	— .7	— .4	1.8	5.1	6.8	6.5	6.1	6.45	1.65	1.6
30.....	1.5	— .7	— .4	— .4	5.1	6.8	6.5	6.1	6.5	1.65	1.6
31.....	1.4	— .7	3.8	6.75	6.5	6.25	1.6

NOTE.—Gage heights affected by ice Jan. 1 to Apr. 15.

Daily discharge, in second-feet, of North Platte River at Pathfinder, Wyo., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1.	240	313	3	5	5	2,030	3,610	6,750	6,090	5,310	5,270	410
2.	240	313	3	5	5	2,030	3,610	6,750	6,040	5,260	4,610	481
3.	435	320	3	5	5	2,030	3,680	6,690	6,040	5,210	4,100	470
4.	356	313	3	5	5	2,920	3,680	6,690	6,040	5,160	3,720	459
5.	243	100	3	5	635	3,005	3,250	6,690	6,040	5,110	3,300	470
6.	200	350	3	5	880	3,640	4,200	6,690	6,040	5,060	2,880	481
7.	214	785	25	5	880	3,750	4,320	6,690	5,990	4,970	2,670	481
8.	286	30	4	5	880	3,860	4,215	6,690	5,935	4,870	2,560	481
9.	220	2	4	5	880	3,940	4,215	6,640	5,935	4,825	2,360	481
10.	240	3	4	5	880	4,015	4,450	6,580	5,935	4,780	2,010	481
11.	260	3	4	5	915	4,095	6,480	6,580	5,880	4,735	1,020	481
12.	260	3	4	5	915	4,135	6,640	6,580	5,830	4,690	1,040	481
13.	260	3	4	5	915	4,135	6,580	6,530	5,830	4,645	520	576
14.	297	3	4	5	915	4,135	6,580	6,470	5,780	4,600	1,350	615
15.	248	3	4	5	915	4,135	6,640	6,470	5,725	4,555	1,435	626
16.	455	3	4	150	850	4,175	6,640	6,470	5,725	4,510	1,380	626
17.	187	3	4	5	310	4,215	6,640	6,470	5,725	4,430	1,100	615
18.	240	3	4	5	5	4,215	6,640	6,470	5,670	4,340	1,075	615
19.	270	3	4	5	5	4,215	6,580	6,470	5,620	4,300	700	510
20.	270	3	4	5	5	4,215	6,640	6,470	5,620	4,260	700	503
21.	270	3	4	5	5	4,215	6,690	6,410	5,570	4,215	760	400
22.	313	3	4	5	5	4,215	6,690	6,360	5,515	4,135	710	417
23.	313	3	4	5	5	4,215	6,750	6,360	5,460	7,140	700	417
24.	313	3	4	5	5	4,215	6,800	6,300	5,410	7,240	700	335
25.	313	3	4	5	5	3,380	6,800	6,250	5,410	7,240	700	333
26.	313	3	4	5	5	3,610	6,800	6,250	5,410	6,970	700	323
27.	665	3	4	5	5	3,610	6,800	6,200	5,410	6,850	685	313
28.	420	3	4	5	370	3,610	6,800	6,145	5,360	6,600	662	435
29.	313	3	4	5	525	3,610	6,800	6,145	5,310	6,320	459	438
30.	313	4	5	370	3,610	6,800	6,145	5,310	6,540	459	438	438
31.	300	4	-----	1,610	-----	6,750	6,145	-----	5,880	-----	-----	438

NOTE.—Discharge represents outflow from Pathfinder reservoir and is entirely controlled. Discharge is estimated mean for 24 hours ending at 8 a. m. each day, operation of the gates being taken into account.

Monthly discharge of North Platte River at Pathfinder, Wyo., for 1912.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
January	665	187	301	18,500
February	785	2	89	5,120
March	25	3	4	246
April	150	5	10	595
May	1,610	5	442	27,200
June	4,215	2,030	3,710	221,000
July	6,800	3,250	5,800	357,000
August	6,750	6,145	6,470	398,000
September	6,090	5,310	5,720	340,000
October	7,240	4,140	5,310	326,000
November	5,270	459	1,680	100,000
December	626	313	474	29,100
The year	7,240	2	2,500	1,820,000

NOTE.—The above records have been changed slightly from the records furnished by the United States Reclamation Service to conform with the computing rules of the United States Geological Survey.

Daily inflow, in second-feet, into Pathfinder reservoir at Pathfinder, Wyo., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1.....	240	313	411	1,500	2,450	10,900	8,040	3,440	1,100	900	1,360	660
2.....	240	313	356	1,520	3,210	12,500	9,150	4,220	980	940	1,390	890
3.....	240	313	371	2,060	4,320	12,060	8,190	4,260	870	920	940	570
4.....	240	313	381	2,130	4,450	12,520	8,220	3,540	1,010	900	470	560
5.....	240	571	396	3,280	4,400	12,050	6,730	3,030	640	870	640	570
6.....	240	350	406	6,290	4,340	14,470	5,200	2,440	720	920	630	580
7.....	240	313	444	3,900	3,650	14,880	5,650	2,260	970	910	1,080	580
8.....	220	638	433	3,880	2,900	14,480	4,760	2,290	660	1,020	840	500
9.....	220	495	448	3,410	2,900	14,810	4,220	2,560	680	1,100	620	500
10.....	240	457	458	4,450	2,910	16,000	4,460	1,920	2,520	1,180	850	520
11.....	260	467	458	4,880	4,570	15,500	4,420	2,140	2,620	1,260	1,400	520
12.....	260	659	458	5,110	5,460	15,820	4,050	1,920	1,710	1,620	1,430	480
13.....	260	421	473	4,260	5,580	14,280	3,780	1,320	2,200	1,300	1,690	530
14.....	300	382	483	3,630	5,210	12,580	3,380	1,400	1,980	1,210	1,160	500
15.....	350	396	498	3,410	4,010	10,880	3,980	1,370	930	1,240	1,350	600
16.....	350	426	508	2,300	4,000	11,030	4,530	1,600	1,110	1,180	1,040	600
17.....	500	467	523	1,660	3,490	10,200	4,110	1,320	1,220	1,140	1,060	460
18.....	290	467	533	1,940	3,220	9,280	3,710	1,540	1,230	1,200	940	470
19.....	297	503	548	1,970	5,050	7,360	4,400	1,930	1,240	1,190	1,130	410
20.....	270	421	558	2,270	6,030	6,400	3,420	1,430	1,320	1,220	900	390
21.....	270	407	458	2,590	8,000	5,420	3,080	1,670	1,360	1,290	910	360
22.....	358	503	468	2,960	8,290	5,920	3,620	980	1,220	1,280	680	380
23.....	313	462	468	3,020	9,090	5,930	3,700	1,600	1,200	1,340	780	360
24.....	313	467	609	1,560	9,910	5,430	2,960	1,020	1,130	1,370	640	390
25.....	313	416	488	1,920	10,320	6,560	2,890	1,090	1,070	1,470	660	500
26.....	313	366	629	1,930	10,120	6,840	2,920	1,080	1,070	1,540	500	440
27.....	330	452	634	1,950	10,450	7,900	2,660	1,080	1,080	1,640	420	430
28.....	330	396	674	2,600	10,080	8,950	2,790	730	1,100	1,620	430	430
29.....	313	396	820	2,340	10,620	9,000	3,320	730	990	1,570	500	360
30.....	313	1,416	3,060	9,410	8,000	2,860	790	960	1,610	460	360
31.....	300	1,588	10,270	3,120	1,120	1,590	320

NOTE.—Inflow is discharge plus algebraic difference in storage less estimated evaporation.

Monthly inflow into Pathfinder reservoir at Pathfinder, Wyo., for 1912.

Month.	Inflow in second-feet.			Inflow (total in acre-feet).
	Maximum.	Minimum.	Mean.	
January.....	500	220	289	17,800
February.....	659	313	433	24,900
March.....	1,590	356	561	34,500
April.....	6,290	1,500	2,930	174,000
May.....	10,620	2,450	6,090	374,000
June.....	16,000	5,420	10,600	631,000
July.....	9,150	2,660	4,460	274,000
August.....	4,260	730	1,860	114,000
September.....	2,620	640	1,230	73,200
October.....	1,640	870	1,240	76,200
November.....	1,690	420	897	53,400
December.....	890	320	491	30,200
The year.....	16,000	220	2,590	1,880,000

NOTE.—The above records have been changed slightly from the records furnished by the United States Reclamation Service to conform with the computing rules of the United States Geological Survey.

NORTH PLATTE RIVER AT GUERNSEY, WYO.

Location.—At the highway bridge, three-quarters of a mile west of Guernsey. The station is 6 miles above the Whalen diversion dam of the United States Reclamation Service. No important tributary between the two points.

Records available.—June 14, 1900, to November 17, 1908; February 12 to October 31, 1912.

Drainage area.—16,200 square miles.

Gage.—The gage was originally located at the highway bridge, but in 1902 it was moved to the railroad bridge 300 feet above. The datum of this gage was lowered 10 feet June 13, 1908. When the station was reestablished in 1912 the gage was located at the highway bridge. The datum of the present gage is 0.24 foot lower than that of the original gage.

Channel.—Shifting; frequent discharge measurements necessary.

Winter flow.—Ice causes backwater during the winter months and discharge measurements are made to determine the approximate flow.

Controlled flow.—The flow of North Platte River is controlled by the Pathfinder dam of the United States Reclamation Service. (See Pathfinder records.)

Diversions.—Between this station and that at Whalen there are only a few minor diversions for irrigation, so the records at the two points are very nearly comparable.¹

Accuracy.—Although the channel is shifting, sufficient discharge measurements have been obtained to make the estimates of flow fairly reliable.

Discharge measurements of North Platte River at Guernsey, Wyo., in 1912.

Date.	Hydrographer.	Gage height.	Dis-charge.	Date.	Hydrographer.	Gage height.	Dis-charge.
		<i>Feet.</i>	<i>Sec.-ft.</i>			<i>Feet.</i>	<i>Sec.-ft.</i>
Feb. 13 ^a	R. H. Fletcher.....	2.90	517	July 22	R. H. Fletcher.....	5.35	6, 790
Mar. 13 ^bdo.....	2.20	233	Aug. 14do.....	5.20	6, 080
May 24do.....	3.78	3, 700	Aug. 31do.....	5.05	6, 120
June 25do.....	4.15	4, 420	Oct. 29do.....	5.25	6, 560

^a Relation of gage height to discharge affected by ice. Measurement made under complete ice cover.

^b Ice present.

Daily gage height, in feet, of North Platte River at Guernsey, Wyo., for 1912.

[Frank Peterson, observer.]

Day.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
1.....			2.8	2.58	3.02	3.85	5.35	5.05	4.85
2.....			3.3	2.72	3.3	4.0	5.5	5.02	4.82
3.....		2.0	3.4	2.88	3.62	4.15	5.48	5.0	4.82
4.....			3.85	2.25	3.55	4.0	5.52	5.0	4.78
5.....			3.28	3.1	3.48	4.0	5.38	5.0	4.78
6.....			3.22	2.92	3.7	4.05	5.3	4.98	4.99
7.....			3.05	2.78	3.78	3.95	5.3	4.96	5.34
8.....			2.68	2.82	3.98	4.4	5.3	4.95	4.86
9.....			2.45	3.18	4.1	4.2	5.3	4.98	4.78
10.....		2.3	2.25	3.32	4.1	4.2	5.28	5.2	4.81
11.....			2.1	4.28	4.12	4.2	5.25	5.36	4.88
12.....	3.0		2.12	4.5	4.15	4.35	5.25	5.48	4.8
13.....	2.9	2.2	2.3	4.12	4.4	4.95	5.22	5.32	4.8
14.....			2.55	3.82	4.38	5.0	5.2	5.22	4.72
15.....			2.3	3.58	4.18	5.0	5.2	5.1	4.7
16.....			2.18	3.48	4.08	5.02	5.35	5.1	4.69
17.....		2.4	2.05	3.48	4.12	5.05	5.25	5.1	4.61
18.....		2.55	2.12	3.65	4.15	5.05	5.28	5.05	4.6
19.....			2.18	3.65	4.15	5.08	5.35	5.05	4.5
20.....			2.25	4.0	4.18	5.5	5.32	5.05	4.46
21.....			2.28	4.02	4.15	6.0	5.25	5.04	4.45
22.....			2.22	4.0	4.15	5.4	5.2	5.0	4.4
23.....			2.18	3.95	4.1	5.35	5.2	5.0	4.36
24.....			2.25	3.8	4.12	5.38	5.2	4.98	4.45
25.....	2.0	2.6	2.3	3.62	4.15	5.32	5.18	4.9	5.3
26.....			2.42	3.48	4.15	5.25	5.15	4.95	5.3
27.....		2.7	2.38	3.38	3.75	5.25	5.1	4.9	5.3
28.....		3.15	2.35	3.28	3.9	5.25	5.1	4.9	5.3
29.....		4.15	2.42	3.18	3.9	5.25	5.1	4.85	5.26
30.....		3.15	2.48	3.08	3.85	5.25	5.1	4.85	5.18
31.....		2.9	2.92	5.28	5.05	5.15

NOTE.—Gage heights Feb. 12 to Mar. 29 distorted by ice.

¹ For other diversions from the North Platte see the descriptions for Pathfinder and Whalen.

Daily discharge, in second-feet, of North Platte River at Guernsey, Wyo., for 1912.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
1.....		2,210	1,930	2,520	3,840	6,700	6,100	5,700
2.....		2,940	2,100	2,940	4,110	7,000	6,040	5,640
3.....		3,100	2,320	3,450	4,380	6,960	6,000	5,640
4.....		3,840	1,540	3,340	4,110	7,040	6,000	5,560
5.....		2,910	2,640	3,230	4,110	6,860	6,000	5,560
6.....		2,820	2,380	3,590	4,200	6,600	5,960	5,980
7.....		2,560	2,180	3,730	4,020	6,600	5,920	6,680
8.....		2,050	2,240	4,070	4,840	6,600	5,900	5,720
9.....		1,770	2,760	4,290	4,470	6,600	5,960	5,560
10.....		1,540	2,970	4,290	4,470	6,560	6,400	5,620
11.....		1,390	4,610	4,330	4,470	6,500	6,720	5,760
12.....		1,410	5,030	4,380	4,750	6,500	6,960	5,600
13.....		1,600	4,330	4,840	5,900	6,440	6,640	5,600
14.....		1,890	3,790	4,300	6,000	6,400	6,440	5,450
15.....		1,600	3,390	4,430	6,000	6,400	6,200	5,410
16.....		1,470	3,230	4,250	6,040	6,700	6,200	5,390
17.....		1,340	3,280	4,330	6,100	6,500	6,200	5,240
18.....		1,410	3,450	4,380	6,100	6,560	6,100	5,220
19.....		1,470	3,450	4,380	6,160	6,700	6,100	5,030
20.....		1,540	4,110	4,430	7,000	6,640	6,100	4,960
21.....		1,580	4,150	4,380	8,000	6,500	6,080	4,940
22.....		1,510	4,110	4,380	6,800	6,400	6,000	4,840
23.....		1,470	4,020	4,290	6,700	6,400	6,000	4,770
24.....		1,540	3,760	4,330	6,760	6,400	5,960	4,940
25.....		1,600	3,450	4,380	6,640	6,360	5,800	6,600
26.....		1,730	3,230	4,380	6,500	6,300	5,900	6,600
27.....		1,690	3,070	3,680	6,500	6,200	5,800	6,600
28.....		1,660	2,910	3,930	6,500	6,200	5,800	6,600
29.....		1,730	2,760	3,930	6,500	6,200	5,700	6,520
30.....	2,720	1,810	2,610	3,840	6,500	6,200	5,700	6,360
31.....	2,350		2,380		6,560	6,100		6,300

NOTE.—Discharge determined from a fairly well-defined rating curve.

Monthly discharge of North Platte River at Guernsey, Wyo., for 1912.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accu- racy.
	Maximum.	Minimum.	Mean.		
April.....	3,840	1,340	1,910	114,000	C
May.....	5,030	1,540	3,170	195,000	B.
June.....	4,840	2,520	4,050	241,000	B.
July.....	8,000	3,840	5,650	347,000	B.
August.....	7,040	6,100	6,520	401,000	B.
September.....	6,960	5,700	6,090	362,000	B.
October.....	6,680	4,770	5,690	350,000	B.
The period.....				2,010,000	

NORTH PLATTE RIVER AND INTERSTATE CANAL AT WHALEN, WYO.

Location.—At the head of the Interstate Canal at Whalen, in sec. 11, T. 26 N., R. 65 W. Nearest important tributary is Cottonwood Canyon Creek, an intermittent stream which enters $1\frac{1}{2}$ miles below.

Records available.—May 1, 1909, to December 31, 1912. These records represent the discharge passing the overfall weir at Whalen and also the amount of water passing the head gates of the canal, which are located just above the Whalen weir.

Drainage area.—Not measured.

Gage.—To determine the flow over the weir a vertical staff is used, with its zero at the weir crest. The discharge is then computed by a weir formula. There are also four sluice gates in the dam through which the discharge is computed. There is also a second gage in the river 75 feet downstream from the crest gage, having its zero 10 feet below that of the weir gage. This latter gage is only used in computing the discharge through the gates when the openings are submerged. The discharge through the head gates of the canal is computed from the nine gate openings. There is a vertical staff located in the canal 1,000 feet below the head-gates, which is used in computing the discharge when the head-gate openings are submerged.

Discharge measurements.—In order to check the coefficients used in the discharge computations a car and cable have been erected 1 mile downstream. Sufficient measurements have not yet been made to complete the checking.

Controlled flow.—The discharge represents largely the effect of the Pathfinder reservoir, which stores water for use in the Interstate canal.

Diversions.—Prior to July 1, 1912, there were adjudicated diversions from North Platte River of 319 second-feet between the Pathfinder reservoir and the Wyoming-Nebraska line, exclusive of the diversion by the United States Reclamation Service. It is not known what percentage of these diversions is above the stations.

Cooperation.—Station maintained and records furnished by the United States Reclamation Service.

Daily discharge, in second-feet, of North Platte River and Interstate canal at Whalen, Wyo., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1.....	310	689	184	1,948	1,461	1,872	3,454	6,587	5,548	5,565	6,133	1,020
2.....	303	636	164	2,158	1,648	2,091	3,545	6,972	5,548	5,565	5,925	861
3.....	293	549	177	2,372	2,051	2,794	3,647	6,857	5,522	5,706	5,335	861
4.....	293	543	162	4,048	2,481	2,871	3,477	6,919	5,522	5,275	5,004	814
5.....	293	543	157	3,169	2,481	2,812	3,667	6,468	5,522	5,420	4,656	643
6.....	293	544	174	2,936	2,051	2,921	3,794	6,345	5,522	5,706	4,602	399
7.....	307	529	168	2,372	1,845	3,215	3,784	6,121	5,522	6,798	3,919	269
8.....	307	489	156	1,745	1,659	3,540	4,106	6,207	5,658	5,706	3,712	269
9.....	338	499	151	1,370	2,183	3,754	4,015	6,245	5,522	5,333	3,342	578
10.....	344	473	158	1,172	2,635	3,857	4,019	6,330	6,115	5,420	3,167	409
11.....	376	416	150	942	4,130	3,940	4,059	6,246	6,399	5,706	3,095	482
12.....	338	545	132	942	5,497	4,007	4,210	6,260	7,062	5,565	2,934	578
13.....	291	619	154	1,023	4,420	4,594	5,538	6,144	6,393	5,420	2,634	726
14.....	316	408	153	1,279	3,687	5,087	5,636	6,130	6,248	5,330	1,884	726
15.....	344	338	150	1,192	3,426	4,245	5,681	6,105	5,827	5,275	1,743	655
16.....	350	356	185	1,105	3,077	4,017	5,872	6,448	5,734	5,193	1,589	758
17.....	351	345	172	942	2,963	4,140	5,766	6,452	5,657	5,139	1,458	881
18.....	357	337	186	942	3,235	4,255	5,766	6,228	5,574	5,139	1,842	803
19.....	369	351	162	942	3,787	4,286	5,862	6,533	5,571	5,004	1,842	834
20.....	409	346	196	1,105	4,198	4,155	6,645	6,533	5,499	5,004	1,645	655
21.....	434	346	210	1,192	4,076	4,196	8,437	6,106	5,488	4,792	1,551	613
22.....	470	314	170	1,105	3,947	4,196	6,505	6,106	5,449	4,738	1,403	613
23.....	384	301	171	1,023	3,819	4,196	6,194	6,113	5,609	4,738	1,136	585
24.....	356	236	170	1,023	3,747	4,060	6,214	5,999	5,676	4,602	1,136	613
25.....	431	252	169	1,105	3,241	4,024	6,219	5,884	5,652	6,889	1,189	776
26.....	453	245	179	1,279	2,970	4,034	6,114	5,845	5,765	6,738	1,189	776
27.....	494	244	464	1,370	2,921	3,189	6,104	5,724	5,649	6,738	1,136	621
28.....	522	239	1,005	1,192	2,609	3,320	6,074	5,734	5,562	6,738	1,020	705
29.....	564	204	1,524	1,279	2,323	3,355	6,074	5,543	5,709	6,650	1,020	730
30.....	601	2,765	1,370	2,182	3,355	6,044	5,558	5,565	6,501	939	835
31.....	593	2,593	1,925	6,055	5,558	6,133	835

NOTE.—Computed by the United States Reclamation Service and published unchanged. The discharges in this table include the discharge of the Interstate Canal and the flow on the river weir and sluices.

Daily discharge, in second-feet, of Interstate canal at Whalen, Wyo., for 1912.

Day.	May.	June.	July.	Aug.	Sept.	Day.	May.	June.	July.	Aug.	Sept.
1.....	0	1,217	1,310	730	810	16.....	485	1,305	1,260	305	676
2.....	0	1,227	1,298	675	810	17.....	483	1,280	1,290	309	653
3.....	0	1,240	1,190	560	920	18.....	531	1,255	1,290	371	570
4.....	0	1,280	1,020	320	920	19.....	618	1,170	1,250	390	567
5.....	0	1,321	775	325	920	20.....	658	1,155	1,215	390	495
6.....	0	1,340	790	345	920	21.....	656	1,080	1,225	390	484
7.....	0	1,350	870	405	920	22.....	653	1,080	1,220	390	418
8.....	105	1,370	870	350	920	23.....	650	1,080	1,180	397	334
9.....	235	1,370	895	245	920	24.....	650	1,090	1,200	424	256
10.....	370	1,365	1,015	330	840	25.....	649	1,140	1,120	454	232
11.....	468	1,340	1,055	389	552	26.....	706	1,150	1,100	560	287
12.....	512	1,295	1,090	403	775	27.....	764	1,180	1,090	710	287
13.....	499	1,305	1,140	428	828	28.....	864	1,275	1,060	720	287
14.....	493	1,305	1,160	555	828	29.....	1,045	1,310	1,060	795	289
15.....	490	1,305	1,205	530	769	30.....	1,160	1,310	1,030	810	0
						31.....	1,210	770	810

NOTE.—Computed by the United States Reclamation Service from weir and canal gage readings and published unchanged. Canal carried water May 8 to Sept. 29.

Monthly discharge of Interstate canal at Whalen, Wyo., for 1912.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
May.....	1,210	0	482	29,600
June.....	1,370	1,080	1,250	74,400
July.....	1,310	770	1,100	67,600
August.....	810	245	478	29,400
September.....	920	0	616	36,700
The period.....	238,000

NOTE.—Computed by the United States Geological Survey from data furnished by the United States Reclamation Service published herewith.

Monthly discharge of North Platte and Interstate canal at Whalen, Wyo., for 1912.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
January.....	601	291	383	23,600
February.....	689	204	411	23,600
March.....	2,765	132	410	25,200
April.....	4,048	942	1,520	90,400
May.....	5,497	1,461	2,990	184,000
June.....	5,087	1,872	3,680	219,000
July.....	8,437	3,454	5,250	323,000
August.....	6,972	5,543	6,200	381,000
September.....	7,062	5,449	5,740	342,000
October.....	6,889	4,602	5,630	346,000
The period.....	1,960,000

NOTE.—Computed by the U. S. Geological Survey from data furnished by the U. S. Reclamation Service, published herewith; includes total flow in the river and Interstate canal.

NORTH PLATTE RIVER AT HENRY, NEBR.

Location.—At Henry post office, on the west line of sec. 3, T. 23 N., R. 58 W., within a half mile of the Nebraska-Wyoming line.

Records available.—May 11 to September 17, 1912.

Drainage area.—Not measured.

Gage.—There are three separate channels and a vertical staff is placed in each. First two gages are set at the same datum; the gage in the third channel is set 1 foot lower to avoid negative readings. The gage heights given are readings from the second channel gage.

Channel.—Shifting; frequent measurements required.

Discharge measurements.—Made from the bridge.

Winter flow.—No data.

Diversions.—Prior to September 1, 1912, there was an approved diversion of 220 second-feet from the North Platte between the Wyoming-Nebraska State line and this station.

Accuracy.—The estimates of daily discharge are based almost directly on the discharge measurements, which have been made at intervals of a few days.

Cooperation.—Station maintained in cooperation with the State engineer, by whom the field data are furnished.

Discharge measurements of North Platte River at Henry, Nebr., in 1912.

[Hydrographer, W. E. Woods.]

Date.	Gage height.	Dis-charge.	Date.	Gage height.	Dis-charge.	Date.	Gage height.	Dis-charge.
	<i>Feet.</i>	<i>Sec.-ft.</i>		<i>Feet.</i>	<i>Sec.-ft.</i>		<i>Feet.</i>	<i>Sec.-ft.</i>
May 11.....	3.0	3,130	June 20.....	2.95	3,140	July 30.....	4.15	5,210
12.....	a 3.9	4,420	21.....	2.95	3,140	31.....	4.7	6,540
13.....	4.1	5,280	22.....	2.95	3,100	Aug. 1.....	4.2	5,960
14.....	3.7	4,510	24.....	2.85	3,110	2.....	4.6	6,810
15.....	3.4	4,250	25.....	2.85	2,930	6.....	4.5	7,010
16.....	3.1	3,410	6.....	2.8	3,000	8.....	4.45	7,000
17.....	3.0	3,210	27.....	2.8	2,840	12.....	4.3	6,830
18.....	2.85	2,970	July 3.....	2.6	2,440	13.....	4.25	6,580
20.....	3.15	3,560	5.....	3.05	3,120	14.....	4.25	6,420
21.....	3.2	3,640	6.....	3.0	2,940	16.....	4.25	6,070
22.....	3.3	3,940	8.....	3.0	2,860	17.....	4.55	7,460
31.....	1.95	1,450	9.....	3.45	3,660	19.....	4.45	6,910
June 1.....	1.80	1,240	10.....	3.15	3,210	20.....	4.50	6,970
3.....	1.70	1,150	11.....	3.05	2,960	23.....	4.35	6,550
4.....	2.0	1,530	12.....	3.05	3,070	24.....	4.2	6,200
5.....	1.95	1,570	18.....	3.85	4,580	26.....	4.2	6,120
7.....	2.4	1,630	19.....	3.9	4,840	27.....	4.15	5,940
8.....	2.15	1,710	20.....	4.2	5,150	28.....	4.15	5,870
12.....	2.9	2,580	22.....	4.85	7,160	Sept. 6.....	3.75	4,960
13.....	3.3	3,740	24.....	4.1	5,110	7.....	3.7	5,100
14.....	3.3	3,490	25.....	4.1	5,050	10.....	4.0	5,640
17.....	2.95	3,130	26.....	4.05	5,230	11.....	4.2	6,100
18.....	2.9	2,970	27.....	4.1	5,280			
19.....	2.9	3,030	29.....	4.1	5,360			

a Made by Hrubesky and Woods.

Daily gage height, in feet, and discharge, in second-feet, of North Platte River at Henry, Nebr., for 1912.

Day.	May.		June.		July.		August.		September.	
	Gage height.	Dis-charge.	Gage height.	Dis-charge.	Gage height.	Dis-charge.	Gage height.	Dis-charge.	Gage height.	Dis-charge.
1.....			1.8	1,250	2.4	2,050	4.2	5,500	-----	5,350
2.....				1,200	2.5	2,200	4.6	6,500	-----	5,250
3.....			1.7	1,150	2.6	2,400	4.6	7,300	-----	5,140
4.....			2.0	1,450	2.85	2,900	4.7	7,600	-----	5,030
5.....			1.95	1,400	3.05	3,300	4.7	7,600	3.75	4,920
6.....				1,720	3.0	2,900	4.5	7,000	3.75	4,920
7.....			2.4	2,050	3.2	3,300	4.5	7,000	4.7	4,920
8.....			2.15	1,680	3.0	2,900	4.45	6,850	3.75	4,920
9.....				1,950	3.45	3,800	4.4	6,700	3.75	4,920
10.....				2,220	3.15	3,200	-----	6,620	4.0	5,550
11.....	3.0	2,900		2,490	3.05	3,000	4.35	6,550	4.2	6,100
12.....	3.9	4,750	2.9	2,750	3.95	3,000	4.3	6,400	-----	6,180
13.....	4.1	5,250	3.3	3,500	3.25	3,400	4.25	6,250	4.25	6,250
14.....	3.7	4,500	3.3	3,500	3.85	4,620	4.25	6,250	4.2	6,100
15.....	3.4	4,050	3.25	3,400	3.9	4,750	4.25	6,250	4.2	6,100
16.....	3.1	3,400	3.0	2,900	3.9	4,750	4.25	6,250	4.15	5,950
17.....	3.0	3,200	2.95	2,820	3.85	4,620	4.55	7,150	4.15	5,950
18.....	2.85	2,900	2.9	2,750	3.85	4,620	4.6	7,300	-----	-----
19.....		3,200	2.9	3,000	3.9	4,750	4.45	6,850	-----	-----
20.....	3.15	3,500	2.95	3,100	4.2	5,500	4.5	7,000	-----	-----
21.....	3.2	3,600	2.95	3,100	4.2	5,500	4.4	6,700	-----	-----
22.....	3.3	3,800	2.95	3,100	4.85	7,150	4.35	6,550	-----	-----
23.....		3,540		3,000	4.1	5,250	4.35	6,550	-----	-----
24.....		3,280	2.85	2,900	4.1	5,250	4.3	6,400	-----	-----
25.....		3,020	2.85	2,900	4.1	5,250	4.3	6,400	-----	-----
26.....		2,750	2.8	2,800	4.05	5,120	4.2	6,100	-----	-----
27.....		2,480	2.8	2,800	4.1	5,250	4.15	5,950	-----	-----
28.....		2,210		2,620	4.1	5,250	4.15	5,950	-----	-----
29.....		1,940		2,430	4.1	5,250	4.1	5,800	-----	-----
30.....		1,670		2,240	4.15	5,380	4.0	5,550	-----	-----
31.....	1.95	1,400			4.7	6,750	-----	5,450	-----	-----

NOTE.—Gage heights Jan. 1 to Mar. 24 affected by ice. Discharge determined from a fairly well-defined rating curve. Discharge interpolated for days for which gage heights are missing.

Monthly discharge of North Platte River at Henry, Nebr., for 1912.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accu- racy.
	Maximum.	Minimum.	Mean.		
May 11-31.....	5,250	1,400	3,210	133,000	C.
June.....	3,500	1,150	2,470	147,000	C.
July.....	7,150	2,050	4,300	264, 00	C.
August.....	7,600	5,450	6,530	402,000	C.
September 1-17.....	6,250	4,920	5,500	185,000	C.
The period.....	-----	-----	-----	1,130,000	

NORTH PLATTE RIVER NEAR MITCHELL, NEBR.

Location.—At highway bridge, 1 mile south of Mitchell on line between secs. 27 and 28, T. 23 N., R. 56 W. The nearest tributary is Spottedtail Creek, an intermittent stream entering just below the station.

Records available.—June 3, 1901, to December 28, 1912. From May 29, 1897, to October 31, 1900, a station was maintained near Gehring. Although no tributaries enter between the two points the records are not directly comparable during the irrigation season, as water is diverted for irrigation.

Drainage area.—24,400 square miles.

Gage.—Chain gage; datum lowered 1.00 foot on May 3, 1902, to avoid negative readings.

Channel.—shifting since 1911.

Discharge measurements.—Made from bridge.

Winter flow.—The river is frozen over during the winter months and records are discontinued.

Artificial control.—The Pathfinder reservoir of the United States Reclamation Service controls the flow at this station to a certain extent.

Diversions.—Prior to September 1, 1912, there were approved diversions of 1,968 second-feet from North Platte River between this station and Henry, and diversions of 75 second-feet from intervening tributaries.

Accuracy.—No discharge measurements were made during 1912, and the estimates for that year are withheld until the rating is checked by further measurements.

Cooperation.—Station maintained in cooperation with the State engineer by whom the field data are furnished.

Daily gage height, in feet, of North Platte River at Mitchell, Nebr., for 1912.

[B. H. Newhold, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1.....		3.0	2.5	3.3	2.8	2.5	2.9	4.0	3.9
2.....		3.0	2.5	3.0	2.8	2.9	4.0	3.9	2.8
3.....		3.0	2.8	2.8	2.3	2.9	4.1	2.7
4.....		2.5	3.3	2.8	2.3	3.0	3.8	2.7
5.....		3.0	2.5	3.6	2.3	3.3	4.2	3.7	2.7
6.....		3.0	2.6	3.7	2.9	2.3	3.3	4.2	3.6	2.6
7.....		2.9	2.6	3.2	2.3	4.1	3.7	3.6	2.5
8.....		2.9	2.5	3.6	3.1	2.4	3.2	4.1	3.8	3.6
9.....		2.9	2.5	3.0	3.1	3.1	4.1	3.8	3.5	2.5
10.....		2.9	2.9	3.1	2.8	3.2	4.1	3.7	2.5
11.....		2.5	2.8	3.2	2.9	3.3	3.9	3.5	2.5
12.....		3.0	2.5	2.8	3.0	3.3	4.1	3.8	3.4	2.5
13.....		3.0	2.5	2.8	4.0	2.9	3.3	4.1	3.1	2.5
14.....		3.0	2.5	3.8	3.3	4.1	3.7	3.0	2.5
15.....		2.9	2.5	2.9	3.8	2.6	3.6	3.9	3.7	2.8
16.....		2.8	2.6	3.0	3.8	3.6	4.0	3.7	3.7	2.8	2.5
17.....		2.7	3.0	3.7	2.6	3.6	4.2	3.7	3.7	2.5
18.....		2.6	2.8	3.2	2.6	3.6	3.7	3.7	2.6	2.6
19.....		2.7	2.6	2.8	2.6	3.6	4.2	3.7	3.8	2.5	3.7
20.....		2.7	2.6	2.8	3.4	3.2	3.6	4.1	3.7	2.5	3.8
21.....		2.7	2.5	3.5	3.2	4.1	3.7	3.7	2.7	3.6
22.....		2.6	2.5	2.8	3.6	3.3	4.3	4.0	3.7	2.8
23.....		2.6	2.6	2.8	3.5	4.0	4.0	3.8	3.7	2.9	2.5
24.....		2.6	2.8	3.5	3.2	4.0	4.0	3.8	3.7	2.5
25.....		2.5	2.7	3.4	3.2	4.0	3.8	3.6	2.8	2.5
26.....		2.6	2.6	2.7	3.2	4.0	3.9	3.7	4.1	2.8	2.5
27.....		2.5	2.4	2.8	3.2	3.2	3.9	3.9	3.7	2.8	2.5
28.....		2.5	2.5	3.0	3.0	3.8	3.7	4.0	2.8	2.6
29.....		2.5	2.6	2.8	2.9	3.0	3.8	3.7	4.0	2.8
30.....		2.9	2.8	2.7	3.9	3.7	3.7	4.0	2.8
31.....		2.7	4.0	3.7	3.9

NORTH PLATTE RIVER AT SCOTTSBLUFF, NEBR.

Location.—At the wagon bridge connecting Scottsbluff with Gehring, on the line between secs. 25 and 26, T. 22 N., R. 55 W. No important tributary within several miles.

Records available.—June 1 to December 7, 1912.

Drainage area.—Not measured.

Gage.—Vertical staff.

Channel.—Shifting; frequent measurements required.

Discharge measurements.—Made from bridge.

Winter flow.—No data.

Diversions.—Prior to September 1, 1912, there were approved diversions of 171 second-feet from the North Platte between this station and Mitchell and 4 second-feet from intervening tributaries.

Accuracy.—The estimates of discharge are based almost directly on the discharge measurements, which were made at intervals of a few days.

Cooperation.—Station is maintained in cooperation with the State engineer, by whom the field data are furnished.

Discharge measurements of North Platte River at Scottsbluff, Nebr., in 1912.

[Hydrographer, Chester Aldrich.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	<i>Feet.</i>	<i>Sec.-ft.</i>		<i>Feet.</i>	<i>Sec.-ft.</i>		<i>Feet.</i>	<i>Sec.-ft.</i>
June 3.....	1.4	792	June 25.....	1.9	2,850	July 20.....	2.25	4,530
4.....	1.35	780	27.....	1.9	2,320	23.....	2.50	6,280
5.....	1.4	828	29.....	1.7	1,610	25.....	2.45	4,930
6.....	1.4	797	July 2.....	1.7	1,600	27.....	2.4	5,270
7.....	1.35	407	6.....	2.0	2,450	Aug. 1.....	2.5	5,590
8.....	1.45	743	9.....	1.92	3,000	3.....	2.7	7,230
13.....	1.8	2,120	11.....	2.05	3,400	6.....	2.7	8,310
15.....	2.15	4,050	13.....	2.0	2,800	13.....	2.55	6,520
17.....	1.95	2,630	16.....	2.25	4,500	15.....	2.55	6,590
20.....	1.9	2,390	18.....	2.2	4,380			

Daily gage height, in feet, of North Platte River at Scottsbluff, Nebr., for 1912.

[Chester Aldrich, observer.]

Day.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Day.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1.....			2.5		2.6	2.75	1.85	16....	2.0	2.25		2.65	2.55	2.1	
2.....			2.65	2.3	2.6	2.8	1.75	17....	1.95	2.1	2.65		2.55	2.0	
3.....	1.4	1.7	2.7	2.3	2.65	2.6	1.8	18....	1.9	2.2			2.6	2.0	
4.....	1.35		2.75	2.3	2.6	2.55	1.7	19....	1.9	2.15	2.7		2.65	1.9	
5.....	1.4				2.5	2.45	2.1	20....	1.9	2.25	2.65		2.6	1.85	
6.....	1.4	2.0	2.7	2.35	2.55	2.45	2.35	21....			2.7		2.65	1.85	
7.....	1.35		2.75		2.5	2.4	2.3	22....		2.5		2.6	2.55	1.8	
8.....	1.45	2.1			2.55	2.35		23....	1.9	2.5	2.7	2.65	2.45	1.75	
9.....		2.1		2.3	2.65	2.4		24....			2.75	2.5	2.45	1.75	
10....				2.4	2.6	2.2		25....	1.9	2.45		2.65	2.45	1.65	
11....	1.7	2.05		2.45	2.65	2.1		26....	1.9	2.4	2.45	2.6	2.85	1.3	
12....	1.7	2.0	2.6	2.45	2.65	2.1		27....	1.9	2.4	2.55	2.65	3.00	1.1	
13....	1.8	2.0	2.55	2.55	2.65	2.0		28....	1.8		2.55	2.5	2.85	1.0	
14....		2.0		2.55	2.65	2.0		29....	1.7	2.35			2.8	.9	
15....	2.15	2.3	2.55	2.6	2.55	2.0		30....	1.65	2.3	2.5	2.65	2.75	.95	
								31....		2.5	2.4		2.7		

NOTE.—Gage heights Nov. 26 to Dec. 7 affected by ice.

Daily discharge, in second-feet, of North Platte River at Scottsbluff, Nebr., for 1912.

Day.	June.	July.	Aug.	Sept.	Oct.	Nov.	Day.	June.	July.	Aug.	Sept.	Oct.	Nov.
1.....	800	1,500	6,050	5,020	6,800	8,120	16.....	2,950	4,400	6,820	7,220	6,420	3,500
2.....	800	1,600	7,220	4,700	6,800	8,600	17.....	2,700	3,500	7,220	7,150	6,420	2,950
3.....	800	1,600	7,650	4,700	7,220	6,800	18.....	2,450	4,100	7,440	7,080	6,800	2,950
4.....	780	2,050	8,120	4,700	6,800	6,420	19.....	2,450	3,800	7,650	7,010	7,220	2,450
5.....	800	2,500	7,880	4,860	6,050	5,700	20.....	2,450	4,400	7,220	6,940	6,800	2,220
6.....	800	2,950	7,650	5,020	6,420	5,700	21.....	2,450	5,220	7,650	6,870	7,220	2,220
7.....	440	3,220	8,120	4,910	6,050	5,350	22.....	2,450	6,050	7,650	6,800	6,420	2,000
8.....	700	3,500	7,850	4,800	6,420	5,020	23.....	2,450	6,050	7,650	7,220	5,700	1,800
9.....	1,000	3,500	7,580	4,700	7,220	5,350	24.....	2,450	5,880	8,120	6,050	5,700	1,800
10.....	1,300	3,360	7,320	5,350	6,800	4,100	25.....	2,450	5,700	6,910	7,220	5,700	1,400
11.....	1,600	3,220	7,060	5,700	7,220	3,500	26.....	2,450	5,350	5,700	6,800	9,100
12.....	1,600	2,950	6,800	5,700	7,220	3,500	27.....	2,450	5,350	6,420	7,220	10,600
13.....	2,000	2,950	6,420	6,420	7,220	2,950	28.....	2,000	5,180	6,420	6,050	9,100
14.....	2,900	2,950	6,420	6,420	7,220	2,950	29.....	1,600	5,020	6,280	6,640	8,600
15.....	3,800	4,700	6,420	6,800	6,420	2,950	30.....	1,400	4,700	6,050	7,220	8,120
							31.....		6,050	5,350	7,650

NOTE.—Discharge after June 7 determined from a fairly well-defined rating curve. Discharge interpolated for days for which gage heights are missing. Discharge Nov. 26 to 30 estimated at 1,250 second-feet.

Monthly discharge of North Platte River at Scottsbluff, Nebr., for 1912.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accu- racy.
	Maximum.	Minimum.	Mean.		
June.....	3,800	440	1,840	109,000	C.
July.....	6,050	1,500	3,980	245,000	B.
August.....	8,120	5,350	7,070	435,000	C.
September.....	7,220	4,700	6,110	364,000	B.
October.....	10,600	6,050	7,080	435,000	B.
November.....	8,600	3,550	211,000	B.
The period.....				1,800,000	

NORTH PLATTE RIVER AT NORTH PLATTE, NEBR.

Location.—At highway bridge half a mile north of North Platte, in sec. 28, T. 14 N., R. 30 W., 1 mile below mouth of Scout Creek and $4\frac{1}{2}$ miles above the junction with the South Platte.

Records available.—February 25, 1895, to December 31, 1912.

Drainage area.—28,500 square miles.

Gage.—A staff gage installed October 15, 1910. From October 5, 1894, to May 31, 1910, the gage was a vertical staff at the railroad bridge, 2 miles east of North Platte. On March 25, 1910, the station was moved 2 miles upstream to its present site and a chain gage reading to a different datum was installed. This gage was stolen July 1, 1910, and the records interrupted until October 15, 1910, when the present gage, reading to a different datum, was placed in position.

Channel.—Very shifting.

Discharge measurements.—Made from highway bridge.

Winter flow.—The river frequently freezes to the bottom during the winter, as it is very shallow.

Diversions.—Prior to September 1, 1912, there were approved diversions of 3,455 second-feet from the North Platte between this station and Scottsbluff and diversions of 923 second-feet from intervening tributaries.

Accuracy.—Owing to the very shifting channel the estimates have been obtained by the indirect method and can be considered only approximate.

Cooperation.—Station maintained in cooperation with the State engineer, by whom the field data were furnished.

Discharge measurements of North Platte River at North Platte, Nebr., in 1912.

Date.	Hydrographer.	Gage height.	Dis-charge.	Date.	Hydrographer.	Gage height.	Dis-charge.
		<i>Feet.</i>	<i>Sec.-ft.</i>			<i>Feet.</i>	<i>Sec.-ft.</i>
Apr. 5	A. B. Price.....	4.8	9,330	Sept. 30	C. J. McNamara.....	4.6	7,320
25	C. G. Hrubesky.....	3.5	2,800	Oct. 14	do.....	4.7	9,040
June 1	C. T. Graham.....	4.5	2,370	31	D. P. Weeks, jr.....	3.6	7,170
July 24	Weeks and Cochran.....	3.8	3,920	Nov. 16	R. L. Cochran.....	3.0	5,420
Aug. 28	D. P. Weeks, jr.....	4.3	5,770	30	C. J. McNamara.....	3.0	2,220
Sept. 16	C. J. McNamara.....	4.6	9,330				

Daily gage height, in feet, of North Platte River at North Platte, Nebr., for 1912.

[Jack Carter, observer.]

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	4.65	3.85	3.2	2.9	4.6	4.0	4.55	3.0	
2	4.85	3.75		2.8	4.7	4.6	4.0	4.6	3.0
3	5.1	3.8	3.0	2.8	4.7	4.6	4.0		3.05
4	5.3	3.85	2.9	2.9		4.4	4.0	4.5	3.2
5	5.5		2.8	3.0	4.8	4.2	4.0	4.45	3.4
6	5.1	3.8	2.95	3.0	4.8	4.0		4.4	3.5
7		3.8	2.8		4.8	3.8	4.0	4.35	3.5
8	4.8	3.8	2.8	3.0	4.8		4.05	4.3	
9	4.8	3.8		3.0	4.7	3.6	4.15	4.2	3.4
10	4.8	4.0	2.8	3.2	4.8	3.6	4.35		3.35
11	4.6	4.2	2.8	3.3		3.8	4.5	4.0	3.35
12	4.55		2.8	3.4	4.8	3.8	4.65	4.0	3.4
13	4.7	4.2	2.8	3.4	4.8	4.1		3.8	3.3
14		4.2	3.0		4.8	4.3	4.6	3.8	3.3
15	4.45	4.25	3.0	3.4	4.8		4.45	3.6	
16	4.35	4.3		3.4	4.8	4.6	4.4	3.6	3.35
17	4.45	4.35	3.2	3.7	4.8	4.6	4.25	3.55	3.4
18	4.4	4.4	3.2	3.8		4.4	4.2	3.5	3.3
19	4.5		3.35	4.0	4.9	4.6	4.1	3.45	3.2
20	4.6	4.4	3.4	4.0	4.8	4.6		3.4	3.25
21	4.3	4.6	3.45		4.8	4.6	4.05	3.4	3.3
22	4.1	4.4	3.6	4.1	4.6		4.0	3.4	
23	3.9	4.25		4.2	4.6	4.0	4.1	3.2	3.2
24	3.85	4.2	3.6	4.4	4.6	4.0	4.2		3.2
25	3.8	4.0	3.4	4.5		4.0	4.2	3.2	3.1
26	3.7		3.4	4.7	4.8	4.0	4.3	3.15	3.0
27		3.8	3.2	4.8	4.8	4.0		3.1	3.0
28		3.8	3.1		4.8	4.1	4.2	3.1	2.85
29	3.85	3.6	3.0	4.8	4.8		4.25	3.0	
30	3.85	3.4		4.6	4.8	4.0	4.35	3.0	2.8
31		3.2		4.6	4.8		4.4		2.8

NOTE.—Gage heights Sept. 16, 28, 30, and Oct. 14 and 30 probably in error.

Daily discharge, in second-feet, of North Platte River at North Platte, Nebr., for 1912.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1.....	8,180	3,500	340	580	8,050	8,700	4,000	8,050	2,230
2.....	9,680	3,100	295	500	8,700	8,050	4,000	8,400	2,250
3.....	11,600	3,300	250	500	8,700	8,050	4,000	8,300	2,450
4.....	13,000	2,850	270	580	9,050	7,650	4,000	8,200	2,900
5.....	14,600	2,780	230	670	9,400	6,500	4,600	8,350	3,600
6.....	11,600	2,700	290	860	9,400	5,400	4,600	8,050	3,950
7.....	10,400	2,700	230	860	9,400	4,400	4,600	8,050	3,950
8.....	9,300	2,700	230	860	9,400	4,000	4,800	7,850	3,780
9.....	9,300	2,150	230	860	8,550	3,600	5,250	7,250	3,600
10.....	9,300	2,800	230	1,130	9,400	3,600	6,250	7,000	3,400
11.....	7,800	3,500	230	1,300	9,400	4,800	7,550	6,800	3,400
12.....	7,420	3,500	310	1,500	9,400	4,800	8,250	7,250	3,600
13.....	8,550	3,500	310	1,500	9,400	6,300	8,640	6,100	3,250
14.....	7,860	2,950	420	1,720	9,400	7,450	9,040	6,100	3,250
15.....	7,180	3,100	420	1,950	9,400	8,390	7,450	5,420	3,320
16.....	6,620	3,250	490	1,950	9,400	9,330	7,150	5,420	3,400
17.....	7,180	3,450	560	2,950	9,400	8,800	6,250	5,200	3,600
18.....	6,900	3,600	560	3,300	9,750	7,650	5,750	4,950	3,250
19.....	7,450	3,350	700	4,150	10,100	8,800	5,500	4,500	2,900
20.....	8,050	3,100	970	4,150	9,400	8,400	5,400	4,300	3,050
21.....	6,350	3,900	1,030	4,720	9,400	8,400	5,300	4,050	3,250
22.....	5,300	3,100	1,270	5,300	8,050	6,750	5,100	4,050	3,080
23.....	4,350	2,550	1,270	5,800	8,050	5,100	5,500	3,300	2,900
24.....	4,120	1,900	1,270	6,900	8,050	4,800	5,750	3,200	2,900
25.....	3,900	1,450	970	7,450	8,700	4,800	5,750	3,100	2,600
26.....	3,500	1,260	970	8,700	9,400	4,800	6,500	2,900	2,250
27.....	3,500	1,080	720	9,400	9,400	4,800	6,120	2,600	2,250
28.....	3,500	1,080	790	9,400	5,770	5,640	5,750	2,600	1,850
29.....	3,500	620	670	9,400	9,400	6,480	6,250	2,300	1,800
30.....	3,500	460	625	8,050	9,400	7,320	7,170	2,220	1,750
31.....	340	8,050	9,400	7,150	1,750

NOTE.—Discharge determined by indirect method for shifting channels. Discharge interpolated for days for which gage heights are missing.

Monthly discharge of North Platte River at North Platte, Nebr., for 1912.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accu- racy.
	Maximum.	Minimum.	Mean.		
April.....	14,600	3,500	7,440	443,000	D.
May.....	3,900	340	2,570	158,000	D.
June.....	1,270	230	572	34,000	D.
July.....	9,400	500	3,690	227,000	D.
August.....	10,100	5,770	9,040	556,000	D.
September.....	9,330	3,600	6,450	384,000	D.
October.....	9,040	4,000	5,920	364,000	D.
November.....	8,400	2,220	5,530	329,000	D.
December.....	3,950	1,750	2,950	181,000	D.
The period.....	4,870,000	

PLATTE RIVER NEAR COLUMBUS, NEBR.

Location.—At Meridian bridge, 3 miles south of Columbus, on line between sec. 36, T. 17 N., R. 1 W., and sec. 31, T. 17 N., R. 1 E., about 10 miles below the mouth of Prairie Creek and 5 miles above the mouth of Loup River.

Records available.—June 4, 1895, to December 20, 1912.

Drainage area.—56,900 square miles.

Gage.—A chain gage installed July 25, 1910. The bridge and the original gage previously used were washed out early in 1910. The new gage is at the same point as the old, but its datum is possibly slightly different. The datum of the original gage was unchanged up to the time of its destruction.

Channel.—Extremely shifting; at this point the river flows in three channels known as the main, middle, and south channels. The gage is located in the main channel.

Discharge measurements.—Made from bridge spanning each channel.

Winter flow.—The river freezes over during the winter and records are discontinued.

Diversions.—Prior to September 1, 1912, there were approved diversions of 4,888 second-feet for irrigation and 1,500 second-feet for power from Platte River between the junction of the two branches and Columbus. The large quantity of water diverted and the evaporation from the wide shallow channels frequently cause the flow to cease at this point during the late summer and fall.

Accuracy.—Owing to the extremely shifting channel the estimates have been obtained by the indirect method and can only be considered fair.

Cooperation.—Station maintained in cooperation with the State engineer, by whom the field data were furnished.

Discharge measurements of Platte River near Columbus, Nebr., in 1912.

Date.	Hydrographer.	Gage height.	Dis-charge.	Date.	Hydrographer.	Gage height.	Dis-charge.
		<i>Feet.</i>	<i>Sec.-ft.</i>			<i>Feet.</i>	<i>Sec.-ft.</i>
Apr. 26	H. G. Hrubesky	3.75	4,796	Aug. 29	D. P. Weeks, jr.	4.0	5,715
May 31	C. T. Graham	2.6	3,455	Sept. 5do.....	3.6	3,456
June 19	D. P. Weeks, jr.	2.75	790	22do.....	4.15	7,006
27do.....	2.55	1,172	29do.....	4.0	6,182
July 3do.....	1.9	579	Oct. 6do.....	4.1	6,481
10do.....	2.2	70	13do.....	4.4	8,880
20do.....	2.65	172	20do.....	4.15	7,204
23do.....	3.5	815	27do.....	4.05	8,775
Aug. 3do.....	4.15	3,227	Nov. 2do.....	4.05	6,220
9do.....	4.45	6,428	10do.....	4.10	7,226
14do.....	4.45	8,517	17do.....	3.80	5,445
21do.....	4.0	6,013	29do.....	2,787

Daily gage height, in feet, of Platte River near Columbus, Nebr., for 1912.

[W. D. Benson, observer.]

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1.	3.6	3.05	2.5	3.7	3.8	4.05	3.95	3.05
2.	3.75	3.25	2.4	3.4	3.75	4.05	4.2	3.1
3.	2.95	2.6	3.5	3.85	4.0	4.35	3.15
4.	3.0	2.5	3.6	4.0	4.25	3.2
5.	3.35	2.8	2.55	3.7	3.6	4.05	4.1
6.	3.0	2.65	3.75	3.55	4.1	4.25
7.	2.95	2.5	2.3	4.0	3.45	4.05
8.	3.05	4.05	3.4	4.2	4.1
9.	3.15	2.85	2.0	4.15	3.4	4.25	4.15
10.	3.35	2.95	1.9	4.15	3.7	4.2	4.1
11.	3.4	3.1	1.7	4.2	3.6	4.4	4.1
12.	3.25	3.2	1.75	4.1	3.65	4.25	4.35
13.	3.45	3.15	2.5	4.45	3.6	4.5
14.	3.1	2.95	2.15	4.45	4.25	4.3
15.	3.35	2.9	1.85	4.25	3.5	4.2	4.0	2.9
16.	3.5	2.7	4.3	3.75	4.5	3.8	3.05
17.	3.65	2.5	4.2	3.7	4.2	3.85	3.05
18.	3.4	2.55	4.1	3.8	4.15	3.85	3.0
19.	3.35	2.4	2.45	3.95	4.00	4.1	3.85	3.1
20.	3.5	2.5	2.0	3.85	4.15	4.1	3.8	3.25
21.	3.55	2.25	2.2	3.95	4.15	4.05	3.7
22.	3.6	3.8	2.15	2.6	4.1	4.2	4.0	3.65
23.	3.6	3.75	2.1	4.1	4.1	4.15
24.	3.8	3.7	2.25	2.7	4.15	4.0	3.95	3.35
25.	4.0	3.4	2.75	2.65	4.05	3.95	3.9	3.35
26.	3.6	3.35	2.8	3.1	4.1	4.2	3.9	3.3
27.	3.5	2.9	2.8	4.1	4.05	4.0	3.35
28.	3.3	3.6	3.25	3.9	4.0	4.0	3.4
29.	3.1	2.8	3.2	4.0	3.9	3.2
30.	3.35	2.45	3.2	3.85	4.2	3.75	3.1
31.	3.1	4.0	3.85	3.85

Daily discharge, in second-feet, of Platte River near Columbus, Nebr., for 1912.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1.....		3,650	1,700	575	4,150	4,700	6,080	5,520	1,700
2.....		4,420	2,250	415	2,750	4,420	6,080	6,220	1,820
3.....		3,800	1,460	750	3,180	4,980	5,800	7,720	1,960
4.....		3,190	1,580	575	3,650	4,320	5,800	7,180	2,100
5.....		2,580	1,120	662	4,150	3,650	6,080	6,350	2,030
6.....		1,580	838	471	4,420	3,410	6,480	7,180	1,960
7.....		1,460	575	280	5,800	2,960	6,690	6,080	1,890
8.....		1,700	908	185	6,080	2,750	6,900	6,350	1,830
9.....		1,960	1,240	90	6,620	2,750	7,180	6,620	1,760
10.....		2,580	1,460	60	6,620	4,150	6,900	7,230	1,690
11.....		2,750	1,820	20	6,900	3,650	8,000	6,350	1,620
12.....		2,250	2,100	30	6,350	3,900	7,180	7,720	1,550
13.....		2,960	1,960	575	8,280	3,650	8,880	7,580	1,490
14.....		1,820	1,460	160	8,280	3,420	7,180	7,450	1,420
15.....		2,580	1,350	50	7,180	3,180	6,900	5,800	1,850
16.....		3,180	925	161	7,450	4,380	8,550	4,700	1,700
17.....		3,900	575	272	6,900	4,150	6,900	5,440	1,700
18.....		2,750	663	383	6,350	4,700	6,620	4,980	1,580
19.....		2,580	415	495	5,520	5,800	6,350	4,980	1,820
20.....		3,180	575	90	4,980	6,620	7,200	4,700	2,150
21.....	3,410	3,940	235	190	5,520	6,620	6,080	4,150	1,750
22.....	3,650	4,700	160	750	6,350	6,900	5,800	3,900	1,750
23.....	3,650	4,380	130	838	6,350	6,350	6,620	3,240	1,750
24.....	4,700	4,150	235	925	6,620	5,800	5,520	2,580	1,750
25.....	5,800	2,750	1,020	838	6,080	5,520	5,250	2,580	1,750
26.....	3,650	2,580	1,120	1,820	6,350	6,900	5,250	2,400	1,750
27.....	3,180	1,350	1,120	2,040	6,350	6,080	8,780	2,580	1,750
28.....	2,400	1,680	3,650	2,250	5,800	5,800	5,800	2,750	1,750
29.....	2,820	1,820	1,120	2,100	5,800	5,250	5,090	2,790	1,750
30.....	3,240	2,580	495	2,100	4,980	6,900	4,380	1,820	1,750
31.....		1,820		5,800	4,980		4,980		1,750

NOTE.—Discharge determined from a fairly well defined curve. Actual discharge used for days when measurements were made—during October, November, and December. Discharge interpolated for days for which gage heights are missing. Discharge Dec. 21–31 estimated at 1,750 second-feet.

Monthly discharge of Platte River near Columbus, Nebr., for 1912.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accu- racy.
	Maximum.	Minimum.	Mean.		
April 21–30.....	5,800	2,400	3,650	72,300	C.
May.....	4,700	1,350	2,780	171,000	C.
June.....	3,650	130	1,140	67,800	B.
July.....	5,800	20	837	51,500	B.
August.....	8,280	2,750	5,810	357,000	C.
September.....	6,900	2,750	4,790	285,000	C.
October.....	8,880	4,380	6,490	339,000	C.
November.....	7,720	1,820	5,160	307,000	C.
December.....	2,150	1,350	1,750	108,000	D.
The period.....				1,760,000	

PLATTE RIVER NEAR LESHARA, NEBR.

Location.—At highway bridge, 2 miles southeast of Leshara, about sec. 34, T. 16 N., R. 9 E., 7 miles above the mouth of Otoe Creek.

Records available.—May 19, 1911, to December 31, 1912.

Drainage area.—Not measured.

Gage.—Chain; datum unchanged.

Channel.—Extremely shifting.

Discharge measurements.—Made from the highway bridge. During 1912 discharge measurements were made from the railroad bridge near Valley.

Winter flow.—Data too meager to determine.

Diversions.—Prior to September 1, 1912, there were approved diversions of 2,500 second-feet for power and irrigation and 4,000 second-feet for power from Platte River between the mouth of Loup River and this station. Below Leshara there were approved diversions of 2,500 second-feet for power.

Accuracy.—Owing to the extremely shifting channel the estimates have been obtained by the indirect method and can only be considered fair.

Cooperation.—Station maintained by the State engineer, by whom the field data are furnished.

Discharge measurements of Platte River near Leshara, Nebr., in 1912.

Date.	Hydrographer.	Gage height.	Dis-charge.	Date.	Hydrographer.	Gage height.	Dis-charge.
		<i>Feet.</i>	<i>Sec.-ft.</i>			<i>Feet.</i>	<i>Sec.-ft.</i>
Apr. 13	D. P. Weeks, jr.	3.85	8,770	Sept. 6	D. P. Weeks, jr.	3.65	6,050
23	do.	4.05	9,250	15	do.	3.45	8,000
29	C. G. Hrubesky	3.7	9,300	21	do.	3.9	9,670
May 30	C. T. Graham	2.75	4,960	28	do.	4.1	9,590
June 21	D. P. Weeks, jr.	2.88	4,680	Oct. 5	do.	3.8	8,630
28	do.	2.9	3,330	12	do.	4.13	11,600
July 5	do.	2.55	2,310	22	do.	3.95	9,980
11	do.	2.6	1,980	26	do.	3.75	8,810
19	do.	2.55	1,590	Nov. 2	do.	3.73	8,800
26	do.	3.0	2,860	9	do.	3.95	10,900
Aug. 2	do.	3.6	7,130	16	do.	3.95	10,300
8	do.	3.6	7,420	26	do.	3.45	6,260
28	do.	3.75	8,560	Dec. 1	do.	3.35	6,800

α Observer's gage heights.

Daily gage height, in feet, of Platte River near Leshara, Nebr., for 1912.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	5.55	5.65	3.6	3.0	2.7	3.4	3.5	3.95	3.7	3.35
2	5.15	5.6	3.5	2.95	2.65	3.6	3.45	3.9	3.75	3.3
3	4.95	4.3	3.6	2.7	2.7	3.35	3.5	3.85	3.8	3.5
4	5.15	4.2	3.6	3.0	2.6	3.4	3.4	3.9	4.0	3.3
5	5.05	4.0	3.55	2.85	2.55	3.65	3.35	3.8	3.2	3.4
6	4.95	3.85	3.35	2.8	2.75	3.4	3.35	3.85	3.9	2.8
7	4.70	3.85	3.3	2.85	2.7	3.55	3.3	3.8	3.95	2.3
8	4.5	3.8	3.15	2.85	2.7	3.6	3.25	3.75	3.75	2.2
9	4.4	4.2	3.2	2.8	2.6	3.65	3.2	3.85	3.95	2.35
10	4.45	4.0	3.05	2.95	2.55	3.7	3.25	3.95	4.0	2.1
11	4.5	3.8	3.1	3.1	2.6	3.8	3.3	3.85	3.6	2.0
12	4.5	3.7	3.25	3.25	2.5	4.1	3.25	4.15	4.0	2.0
13	4.7	3.65	3.55	3.55	2.45	3.85	3.4	3.95	4.35	2.5
14	4.6	3.6	3.45	3.4	2.4	4.15	3.45	4.1	3.45	3.2
15	4.65	3.45	3.4	3.35	2.45	4.1	3.45	4.05	4.25	3.35
16	4.6	3.4	3.2	3.3	2.6	4.15	3.65	4.1	3.95	3.0
17	4.5	3.35	3.4	3.25	2.45	4.1	3.7	4.15	3.7	2.85
18	4.65	3.3	3.35	3.0	2.5	4.1	3.65	4.05	3.7	2.65
19	4.7	3.25	3.2	3.0	2.55	3.95	3.75	3.95	3.75	2.6
20	5.0	3.3	2.9	2.3	2.6	3.85	3.9	3.9	3.8	3.85
21	4.9	3.55	2.95	2.9	2.6	3.85	3.9	4.1	3.75	3.8
22	5.3	3.65	3.1	2.85	2.6	3.8	3.85	3.95	3.7	3.75
23	6.0	3.8	3.45	2.7	2.65	3.85	3.95	3.9	3.7	3.85
24	6.2	3.8	3.4	2.65	2.8	3.75	3.9	3.9	3.6	3.75
25	6.1	3.7	3.3	2.65	2.95	3.8	3.95	3.85	3.5	3.8
26	6.25	3.6	3.25	2.6	3.0	3.75	3.8	3.75	3.45	3.7
27	6.65	3.75	3.1	2.8	2.95	3.75	3.9	3.75	3.5	3.75
28	6.9	3.95	3.05	2.9	3.15	3.75	4.1	3.75	3.4	3.75
29	6.95	3.8	2.9	2.85	3.35	3.7	3.95	3.7	3.45	3.7
30	6.55	3.65	2.75	2.8	3.25	3.6	3.9	3.65	3.3	3.6
31	6.6	-----	2.8	-----	3.2	-----	-----	3.75	-----	3.65

NOTE.—Gage heights Dec. 14-31 affected by ice.

Daily discharge, in second-feet, of Platte River near Leshara, Nebr., for 1912.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1.....	18,000	18,600	8,800	5,800	2,700	5,800	6,800	8,950	8,600	6,800
2.....	15,600	18,300	8,300	5,800	2,550	7,250	6,580	8,700	8,810	6,600
3.....	14,400	11,200	8,800	4,800	2,700	6,120	6,800	8,450	9,700	7,500
4.....	15,600	10,600	8,800	5,800	2,400	6,350	6,350	9,000	10,500	6,600
5.....	15,000	9,500	8,550	5,200	2,300	7,480	6,120	8,500	6,600	7,050
6.....	14,400	8,750	7,550	5,000	2,850	6,350	6,120	9,200	10,200	4,500
7.....	12,900	8,750	7,300	5,200	2,700	7,020	5,900	8,900	10,800	3,000
8.....	11,700	8,500	6,550	5,200	2,700	7,250	5,680	8,550	9,600	2,800
9.....	11,200	10,600	6,800	5,000	2,000	7,750	5,450	9,700	10,900	3,150
10.....	11,400	9,500	6,050	5,600	1,880	8,000	5,680	10,200	11,000	2,650
11.....	11,700	8,500	6,300	5,500	2,000	8,500	5,900	9,700	8,800	2,500
12.....	11,700	8,000	7,050	6,150	1,750	10,000	5,680	11,400	10,800	2,500
13.....	12,900	7,750	8,550	7,650	1,650	8,750	7,800	10,300	12,800	3,500
14.....	12,300	7,500	8,050	6,900	1,550	10,300	8,050	11,100	7,600
15.....	12,600	6,750	7,800	6,650	1,650	10,000	8,050	10,800	12,000
16.....	12,300	6,500	6,800	6,400	1,750	10,300	9,050	11,100	10,300
17.....	11,700	6,300	7,800	6,150	1,400	10,000	9,300	11,100	8,600
18.....	12,600	6,100	7,550	5,100	1,500	10,000	9,050	10,600	8,600
19.....	12,900	5,900	6,800	5,100	1,620	9,700	8,650	10,000	8,600
20.....	14,700	6,100	5,400	2,800	1,750	9,150	9,400	9,700	8,900
21.....	14,100	7,020	5,600	4,200	1,750	9,150	9,400	10,600	8,300
22.....	16,500	7,480	6,300	4,000	1,750	8,900	9,150	9,980	8,000
23.....	20,700	8,200	8,050	3,600	1,880	9,150	9,700	10,000	7,700
24.....	22,100	8,800	7,800	3,000	2,250	8,650	9,400	10,000	7,200
25.....	21,400	8,200	7,300	3,000	2,650	8,900	9,700	9,400	6,500
26.....	22,400	7,800	7,050	2,800	2,800	8,650	8,900	8,810	6,260
27.....	25,200	9,100	6,300	3,400	2,650	8,650	9,400	8,810	6,500
28.....	27,000	10,200	6,050	3,300	3,300	8,650	10,600	8,810	6,300
29.....	27,400	9,400	5,400	3,150	4,100	8,400	9,700	8,600	6,800
30.....	24,600	9,050	4,800	3,000	3,700	7,900	9,400	8,400	6,400
31.....	24,900	5,000	4,000	7,350	8,810

NOTE.—Discharge determined by the indirect method for shifting channels.

Monthly discharge of Platte River near Leshara, Nebr., for 1912.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accu- racy.
	Maximum.	Minimum.	Mean.		
March.....	27,400	11,200	16,500	1,010,000	C.
April.....	18,600	5,900	8,960	533,000	C.
May.....	8,800	4,800	7,070	435,000	C.
June.....	7,650	2,800	4,830	287,000	C.
July.....	4,100	1,400	2,330	143,000	C.
August.....	10,300	5,800	8,400	516,000	C.
September.....	10,600	5,450	7,930	472,000	C.
October.....	11,400	8,400	9,620	592,000	C.
November.....	12,800	6,260	8,790	523,000	C.
December.....	7,500	2,500	3,360	207,000	D.
The period.....	4,720,000

BIG CREEK NEAR DOWNINGTON, WYO.

Location.—NE. $\frac{1}{4}$ of SW. $\frac{1}{4}$ sec. 32, T. 13 N., R. 81 W., in the Hayden National Forest.

Below all important tributaries. One small creek enters below the gaging station.

Records available.—Gage heights, May 7, 1911, to June 30, 1912.

Drainage area.—Not measured.

Gage.—Staff.

Cooperation.—Station maintained in cooperation with the United States Forest Service.

Daily gage height, in feet, of Big Creek near Downington, Wyo., for 1912.

[Mark Edick, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	Day.	Jan.	Feb.	Mar.	Apr.	May.	June.
1.....	2.3	2.4	2.6	1.8	3.0	16.....	2.2	2.3	1.6	2.2	2.8
2.....	2.3	2.3	2.8	1.6	2.0	17.....	2.2	2.3	1.7	2.5
3.....	2.3	2.3	2.8	1.6	1.8	3.3	18.....	2.3	2.3	1.7	2.6
4.....	2.3	2.3	3.0	1.7	1.6	19.....	2.6	2.3	1.8	2.5
5.....	2.3	2.3	3.1	1.7	1.5	20.....	2.6	2.3	2.8	1.6	2.7
6.....	2.3	2.4	3.0	1.7	1.6	3.2	21.....	2.4	2.3	2.2	2.6
7.....	2.3	2.6	3.2	1.8	2.0	3.3	22.....	2.3	2.3	2.2	2.6	2.7
8.....	2.3	2.6	3.2	1.8	2.4	3.4	23.....	2.2	2.3	2.3	2.6	2.7
9.....	2.3	2.6	3.3	1.6	2.0	3.5	24.....	2.2	2.3	2.3	2.6	2.8
10.....	2.3	2.3	3.2	1.6	1.9	3.6	25.....	2.3	2.3	2.6	1.6	2.8	2.9
11.....	2.3	2.3	3.2	1.7	1.6	26.....	2.3	2.3	2.6	2.8	2.9
12.....	2.3	2.3	3.3	1.5	1.5	3.3	27.....	2.3	2.5	2.6	1.5	2.7	3.0
13.....	2.2	2.3	3.2	1.6	3.2	28.....	2.3	2.5	2.8	1.7	2.8
14.....	2.2	2.3	1.6	3.2	29.....	2.3	2.5	2.4	2.8	3.0
15.....	2.2	2.3	1.8	3.0	30.....	2.3	2.2	1.8	3.0	2.9
							31.....	2.4	2.2	3.0

NOTE.—Gage heights Jan. 1 to Mar. 31 affected by ice.

FRENCH CREEK NEAR FRENCH, WYO.

Location.—In sec. 4, T. 14 N., R. 81 W., about $3\frac{1}{2}$ miles southeast of French, in the Cheyenne National Forest. Station is 2 miles above the mouth of creek and is below all tributaries.

Records available.—April 30, 1911, to October 31, 1912.

Drainage area.—57 square miles (measured from Forest Atlas).

Gage.—Vertical staff.

Channel.—Somewhat shifting.

Discharge measurements.—Made by wading.

Winter flow.—No data.

Diversions.—Prior to July 1, 1912, there were no adjudicated diversions from French Creek above the station, but below the station there are diversions of 3 second-feet.

From North French Creek there is an adjudicated diversion of 4 second-feet.

Accuracy.—Results can not be considered better than fair.

Discharge measurements of French Creek near French, Wyo., in 1912.

Date.	Hydrographer.	Gage height.	Discharge.
		<i>Feet.</i>	<i>Sec.-ft.</i>
June 7	R. H. Fletcher.....	3.40	777
July 17do.....	2.45	274
Aug. 24do.....	1.70	61.0
Oct. 20do.....	1.54	36.9

Daily gage height, in feet, of French Creek near French, Wyo., for 1912.

[Mrs. J. W. Jenkins, observer.]

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
1....	1.15	1.55	2.75	3.6	2.25	1.68	1.52	16....	1.35	1.78	2.8	2.5	1.8	1.62	1.52
2....	1.2	1.55	2.85	3.5	2.18	1.66	1.5	17....	1.4	1.85	2.65	2.48	1.8	1.62	1.5
3....	1.32	1.65	3.05	3.4	2.1	1.6	1.5	18....	1.4	2.2	2.6	2.4	1.8	1.6	1.5
4....	1.35	1.6	3.15	3.25	2.05	1.57	1.5	19....	1.4	2.2	2.6	2.42	1.75	1.58	1.5
5....	1.35	1.5	3.3	3.1	2.0	1.57	1.55	20....	1.4	2.32	2.8	2.45	1.75	1.55	1.5
6....	1.35	1.45	3.3	2.95	1.95	1.55	1.6	21....	1.4	2.48	3.0	2.38	1.75	1.52	1.55
7....	1.38	1.45	3.35	2.9	1.95	1.55	1.58	22....	1.4	2.48	3.0	2.3	1.7	1.52	1.65
8....	1.35	1.62	3.35	2.85	1.98	1.52	1.55	23....	1.4	2.48	3.35	2.28	1.7	1.55	1.6
9....	1.38	1.72	3.35	2.8	1.92	1.56	1.5	24....	1.4	2.5	3.45	2.22	1.7	1.55	1.65
10....	1.35	1.8	3.3	2.75	1.9	1.66	1.58	25....	1.4	2.6	3.5	2.2	1.68	1.55	1.55
11....	1.4	1.7	3.3	2.7	1.85	1.6	1.55	26....	1.4	2.6	3.5	2.2	1.65	1.6	1.5
12....	1.38	1.68	3.25	2.7	1.85	1.58	1.54	27....	1.4	2.48	3.45	2.25	1.62	1.6	1.55
13....	1.32	1.6	3.25	2.7	1.8	1.55	1.55	28....	1.45	2.5	3.5	2.18	1.78	1.57	1.6
14....	1.3	1.58	3.3	2.85	1.8	1.65	1.55	29....	1.52	2.65	3.65	2.1	1.7	1.55	1.6
15....	1.35	1.65	3.0	2.8	1.8	1.64	1.52	30....	1.5	2.72	3.65	2.42	1.88	1.52	1.58
								31....		2.75		2.32	1.72		1.55

Daily discharge, in second-feet, of French Creek near French, Wyo., for 1912.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
1....	9	38	482	815	215	59	34	16....	18	81	460	290	86	49	34
2....	10	38	528	765	187	56	31	17....	21	100	392	282	86	49	31
3....	15	54	620	715	155	45	31	18....	21	235	370	250	86	45	31
4....	18	45	670	640	136	41	31	19....	21	235	370	258	74	42	31
5....	18	31	745	565	120	41	38	20....	21	289	460	270	74	38	31
6....	18	26	745	492	105	38	45	21....	21	361	550	242	74	34	38
7....	20	26	770	470	105	38	42	22....	21	361	550	210	63	34	54
8....	18	49	725	448	114	34	38	23....	21	361	725	202	63	38	45
9....	20	68	725	425	96	39	31	24....	21	370	775	178	63	38	38
10....	18	86	700	402	115	56	42	25....	21	415	800	170	59	38	38
11....	21	63	700	380	100	45	38	26....	21	415	800	170	54	45	31
12....	20	59	675	380	100	42	37	27....	21	361	775	190	49	45	38
13....	15	45	675	380	86	38	38	28....	26	370	800	187	81	41	45
14....	14	42	700	448	86	53	38	29....	34	438	875	155	63	38	45
15....	18	54	550	425	86	52	34	30....	31	469	875	289	109	34	42
								31....		482		242	68		38

NOTE.—Discharge determined from two parallel curves and by the indirect method for shifting channels.

Monthly discharge of French Creek near French, Wyo., for 1912.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accu- racy.
	Maximum.	Minimum.	Mean.		
April.....	34	9	19.7	1,170	C.
May.....	482	26	196	12,100	C.
June.....	875	370	653	38,900	D.
July.....	815	155	366	22,500	D.
August.....	215	49	95.4	5,870	C.
September.....	59	34	42.8	2,550	C.
October.....	54	31	37.4	2,300	C.
The period.....				85,400	

BRUSH CREEK NEAR SARATOGA, WYO.

Location.—On the county bridge, one-half mile above the mouth, about sec. 8, T. 15 N., R. 82 W. It is 18 miles southeast of Saratoga. No tributary below the station and none for several miles above.

Records available.—April 28, 1911, to October 31, 1912.

Drainage area.—Not measured.

Gage.—Chain-gage type.

Channel.—Permanent.

Discharge measurements.—Made from bridge.

Winter flow.—No data.

Diversions.—Prior to July 1, 1912, there were adjudicated diversions from Brush Creek amounting to 87 second-feet and from its tributaries 27 second-feet. Nearly all the diversions are above the station.

Accuracy.—Conditions are favorable for accurate results and the estimates of flow should be reliable.

Discharge measurements of Brush Creek near Saratoga, Wyo., in 1912.

Date.	Hydrographer.	Gage height.	Discharge.
June 9	R. H. Fletcher	<i>Feet.</i> 5.15	<i>Sec.-ft.</i> 1,700
July 17do.....	2.95	140'
Aug. 23do.....	1.72	14.4
Oct. 20do.....	2.37	59.4

Daily gage height, in feet, and discharge, in second-feet, of Brush Creek near Saratoga, Wyo., for 1912.

[Jessie Cunningham, observer]

Day.	June.		July.		August.		September.		October.	
	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
1.			4.45	862	2.85	124	1.65	14	2.2	45
2.			4.35	750	2.55	81	1.65	14	2.2	45
3.			4.15	555	2.55	81	1.6	12	2.2	45
4.			3.9	415	2.4	64	1.67	14	2.2	45
5.			3.8	375	2.35	59	1.6	12	2.2	45
6.			3.65	324	2.35	59	1.6	12	2.2	45
7.	5.4	2,000	3.6	307	2.25	50	1.6	12	2.4	64
8.	5.4	2,000	3.65	324	2.2	45	1.85	23	2.2	45
9.	5.5	2,120	3.5	276	2.2	45	1.85	23	2.4	64
10.	5.08	1,620	3.55	292	2.15	41	1.7	15	2.4	64
11.	4.95	1,460	3.53	285	2.1	37	1.7	15	2.4	64
12.	4.8	1,280	3.5	276	1.85	22	1.7	15	2.4	64
13.	4.82	1,300	3.43	256	1.7	15	1.85	23	2.3	54
14.	4.18	579	4.0	490	1.75	17	2.0	30	2.2	45
15.	4.05	488	3.47	267	1.65	14	2.1	37	2.1	37
16.	3.9	415	3.2	195	1.65	14	2.15	41	2.2	45
17.	3.7	340	2.95	142	1.65	14	2.15	41	2.2	45
18.	3.6	307	2.85	124	1.65	14	2.15	41	2.2	45
19.	3.65	324	3.2	195	1.65	14	2.3	54	2.25	50
20.	3.85	395	2.95	142	1.75	17	2.3	54	2.33	57
21.	3.95	438	2.85	124	1.75	17	2.25	50	2.15	41
22.	4.4	805	2.8	115	1.75	17	2.1	37	2.15	41
23.	4.75	1,220	2.65	94	1.65	14	2.1	37	2.45	70
24.	4.8	1,280	2.55	81	1.65	14	2.2	45	2.45	70
25.	4.72	1,180	2.5	75	1.7	15	2.1	37	2.45	70
26.	4.7	1,160	2.52	77	1.7	15	2.1	37	2.35	60
27.	4.68	1,140	2.45	70	1.75	17	2.1	37	2.55	80
28.	4.6	1,040	2.52	77	1.8	19	2.1	37	2.55	80
29.	4.6	1,040	2.6	87	2.3	54	2.2	45	2.55	80
30.	5.0	1,520	3.0	151	2.3	54	2.2	45	2.45	70
31.			3.25	208	2.05	34			2.55	80

NOTE.—Discharge determined from a well-defined rating curve.

Monthly discharge of Brush Creek near Saratoga, Wyo., for 1912.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accu- racy.
	Maximum.	Minimum.	Mean.		
June 7-30.....	2, 120	307	1, 060	50, 500	B.
July.....	862	70	257	15, 800	A.
August.....	124	14	35. 4	2, 180	A.
September.....	54	12	30. 3	1, 860	A.
October.....	80	37	56. 6	3, 480	A.
The period.....				73, 800	

ENCAMPMENT RIVER AT ENCAMPMENT, WYO.

Location.—At the lower end of the smelter grounds at Encampment, in sec. 6, T. 14 N., R. 83 W. The nearest tributary is the North Fork, which enters 1 mile above.

Records available.—May 2, 1911, to October 31, 1912.

Drainage area.—235 square miles (measured from topographic sheets and King's Atlas).

Gage.—Chain-gage type. June 6, 1912, the gage was moved 175 feet upstream. Although set to the original datum the present gage reads approximately 1 foot higher, due to the slope of the river.

Channel.—A short distance below the original section is a low diversion dam which caused backwater whenever brush or drift collected on its crest. The present location is above the influence of the dam.

Discharge measurements.—Made from car and cable.

Winter flow.—Ice causes backwater during the winter months.

Diversions.—Three large irrigation ditches divert water at a point 1 mile above the station. The smelter company has a pipe line which diverts water above the station, but as the tailrace of the power plant, which the pipe line supplies, is just above the station, the amount diverted passes the gage. Water is also diverted below the station. Prior to July 1, 1912, there were adjudicated diversions from Encampment River amounting to 61 second-feet and from tributaries entering above the station 31 second-feet.

Accuracy.—The lodging of debris on the point of control makes the conditions at the original location somewhat uncertain, but at the present location conditions are favorable for accurate results.

Discharge measurements of Encampment River at Encampment, Wyo., in 1912.

Date.	Hydrographer.	Gage height.	Dis-charge.	Date.	Hydrographer.	Gage height.	Dis-charge.
		<i>Feet.</i>	<i>Sec.-ft.</i>			<i>Feet.</i>	<i>Sec.-ft.</i>
Jan. 28a	R. H. Fletcher	4. 00	48. 5	Aug. 23	R. H. Fletcher.....	c 4. 15	66. 8
June 6do.....	b 7. 00	3, 020	Oct. 19do.....	c 4. 33	79
July 16do.....	c 5. 65	471				

a Relation of gage height to discharge affected by ice. Measurement made under complete ice cover at cable section.

b Gage height at original location. Gage height at new location is 8 feet.

c Gage height at new location.

Daily gage height, in feet, of Encampment River at Encampment, Wyo., for 1912.

[Paul Eldrekin, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
1.			3.8		3.4		6.4	5.0	3.75	4.6
2.						8.0	6.3	5.0	3.75	4.6
3.		4.0					6.0	4.9	3.95	4.6
4.					3.8		5.8	4.8	3.95	4.45
5.						7.4	5.6	4.8	4.1	4.45
6.				3.3		7.0	5.6	4.8	4.05	4.45
7.			3.7			8.0	5.6	4.8	4.15	4.35
8.						8.0	5.5	4.9	4.15	4.35
9.						8.0	5.4	5.0	4.25	4.35
10.						7.8	5.4	5.0	4.25	3.7
11.					4.2	7.8	5.4	5.0	4.3	4.3
12.		3.9				7.0	5.4	4.8	4.35	4.35
13.				3.2		7.5	5.4	4.7	4.4	4.35
14.						7.8	5.4	4.7	4.8	4.35
15.					3.9	7.2	5.2	4.6	5.0	4.35
16.						6.8	5.2	4.45	5.0	4.35
17.		3.5		3.2	5.1	6.4	5.2	4.3	5.0	4.35
18.						6.6	5.2	4.15	4.95	4.4
19.						6.2	5.2	4.1	4.95	4.5
20.				3.3		6.2	5.5	4.0	4.9	4.5
21.					5.7	6.4	5.4	4.0	4.8	4.5
22.					5.9	6.4	5.3	3.9	4.8	4.4
23.					5.9	6.4	5.3	3.9	4.8	4.4
24.					6.2	6.7	5.2	3.9	4.8	4.4
25.					6.5	7.0	5.2	3.9	4.8	4.4
26.					6.9	7.1	5.2	3.9	4.6	4.4
27.				3.4	6.8	7.0	5.4	3.9	4.6	4.35
28.		4.4			6.2	7.0	5.4	3.9	4.6	4.3
29.					6.5	7.1	5.3	3.9	4.6	4.3
30.			3.6			6.8	5.2	3.9	4.6	4.2
31.							5.1	3.9	4.2

NOTE.—Gage heights during January, February, and Mar. 1 to Apr. 6 affected by ice.

Daily discharge, in second-feet, of Encampment River at Encampment, Wyo., for 1912.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
1.		180	3,820	1,040	229	22	129	16.	150	662	1,430	291	100	229	84
2.		210	4,310	950	229	22	129	17.	150	1,020	1,040	291	76	229	84
3.		240	4,050	710	201	40	129	18.	155	1,140	1,230	291	60	215	91
4.		270	3,790	575	175	40	100	19.	180	1,270	865	291	55	215	109
5.		295	3,530	460	175	55	100	20.	165	1,390	865	410	45	201	109
6.		320	1,650	460	175	50	100	21.	160	1,520	1,040	366	45	175	109
7.		345	3,000	460	175	60	84	22.	160	1,710	1,040	326	35	175	91
8.		370	3,000	410	201	60	84	23.	155	1,710	1,040	326	35	175	91
9.		390	3,000	366	229	70	84	24.	155	2,020	1,330	291	35	175	91
10.		410	2,700	366	229	70	20	25.	160	2,370	1,650	291	35	175	91
11.		435	2,700	366	229	76	76	26.	170	2,880	1,770	291	35	129	91
12.		405	1,650	366	175	84	84	27.	180	2,750	1,650	366	35	129	84
13.	150	375	2,270	366	151	91	84	28.	180	2,020	1,650	366	35	129	76
14.	150	345	2,700	366	151	175	84	29.	180	2,370	1,770	326	35	129	76
15.	150	305	1,890	291	129	229	84	30.	180	2,850	1,430	291	35	129	65
								31.		3,330	259	35	65

NOTE.—Discharge determined from rating curves as follows: Apr. 13 to June 5, from a curve well defined below 1,600 second-feet. June 6 to Oct. 31, from a fairly well-defined curve drawn parallel to standard curve. Discharge interpolated for days for which gage heights are missing.

Monthly discharge of Encampment River at Encampment, Wyo., for 1912.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accu- racy.
	Maximum.	Minimum.	Mean.		
April 13-30.....	180	150	162	5,780	B.
May.....	3,330	180	1,160	71,300	B.
June.....	4,310	865	2,130	127,000	C.
July.....	1,040	259	407	25,000	B.
August.....	229	35	116	7,130	B.
September.....	229	22	125	7,440	B.
October.....	129	20	89.6	5,510	B.
The period.....				249,000	

COW CREEK NEAR SARATOGA, WYO.

Location.—At highway bridge in sec. 36, T. 16 N., R. 84 W., 9 miles south of Saratoga.

No tributaries between the station and the mouth, 4 miles below; Calf Creek enters about 2 miles above.

Records available.—May 3, 1911, to October 31, 1912.

Drainage area.—Not measured.

Gage.—Vertical staff.

Channel.—During 1912 there was no apparent shift in the channel.

Discharge measurements.—Made from bridge during high water and by wading at ordinary stages.

Winter flow.—Ice causes backwater during the winter months and the observations are discontinued.

Diversions.—Prior to July 1, 1912, there were adjudicated diversions from Cow Creek of 84 second-feet and from its tributaries 27 second-feet, nearly all above the station.

Accuracy.—As there was no apparent shift in the channel during 1912 the estimates are considered fairly reliable.

Discharge measurements of Cow Creek near Saratoga, Wyo., in 1912.

Date.	Hydrographer.	Gage height.	Dis- charge.
		<i>Feet.</i>	<i>Sec.-ft.</i>
June 5	R. H. Fletcher.....	3.90	289
July 16do.....	2.30	14.9
Aug. 23do.....	2.00	a 1.5
Oct. 19do.....	2.30	12.2

a Estimated.

Daily gage height, in feet, of Cow Creek near Saratoga, Wyo., for 1912.

[Margaret Sullivan, observer.]

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
1....	2.2	2.7	2.7	2.5	2.05	2.25	16....	2.2	2.45	3.05	2.25	1.87	2.15	2.35
2....	2.25	2.2	3.75	2.7	2.5	1.95	2.25	17....	2.15	2.5	2.8	2.3	1.95	2.27	2.35
3....	2.3	2.2	3.7	2.6	2.5	1.95	2.25	18....	2.15	2.65	2.72	2.22	1.95	2.35	2.35
4....	2.3	2.25	3.8	2.6	2.4	1.95	2.25	19....	2.15	2.92	2.72	2.2	1.95	2.35
5....	2.2	2.2	3.85	2.5	2.35	1.95	2.25	20....	2.1	2.8	2.68	2.2	1.95	2.33
6....	2.25	2.2	3.62	2.45	1.95	2.25	21....	2.18	2.95	2.65	2.3	1.95	2.3	2.3
7....	2.22	2.2	3.6	2.4	2.3	1.95	2.25	22....	2.15	3.25	2.65	2.35	2.25	2.3
8....	2.25	2.3	3.6	2.35	2.3	1.95	2.35	23....	2.12	3.08	2.65	2.3	2.25	2.3
9....	2.25	2.4	3.62	2.3	2.3	1.97	2.35	24....	2.15	3.1	2.68	2.3	2.25	2.38
10....	2.25	2.48	3.62	2.25	2.1	2.15	2.35	25....	2.2	2.98	2.78	2.3	1.95	2.25	2.38
11....	2.25	2.4	3.6	2.2	2.1	2.0	2.35	26....	2.2	3.12	2.85	2.3	1.95	2.25
12....	2.3	2.4	3.55	2.2	2.02	1.95	2.35	27....	2.2	2.9	2.75	2.3	1.95	2.25	2.4
13....	2.15	2.4	3.52	2.22	2.0	2.35	28....	2.2	3.0	2.8	2.2	1.95	2.25	2.4
14....	2.25	2.3	3.48	2.2	1.8	2.35	29....	2.2	3.38	2.75	2.18	2.0	2.25	2.4
15....	2.25	2.4	3.22	2.32	1.8	2.15	2.35	30....	2.25	3.5	2.7	2.3	2.1	2.25	2.4
								31....	3.5	2.48	2.05	2.4

Daily discharge, in second-feet, of Cow Creek near Saratoga, Wyo., for 1912.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
1.....	10	6	82	82	48	2.0	10	16.....	6	40	143	10	1.0	4	23
2.....	10	6	264	82	48	1.2	10	17.....	4	48	100	15	1.2	12	23
3.....	15	-6	256	65	48	1.2	10	18.....	4	74	86	8	1.2	23	23
4.....	15	10	273	65	31	1.2	10	19.....	4	120	86	6	1.2	23	21
5.....	6	6	282	48	23	1.2	10	20.....	2	100	79	6	1.2	20	18
6.....	10	6	242	40	19	1.2	10	21.....	5	126	74	15	1.2	15	15
7.....	8	6	238	31	15	1.2	10	22.....	4	178	74	23	1.2	10	15
8.....	10	15	238	23	15	1.2	23	23.....	3	148	74	15	1.2	10	15
9.....	10	31	242	15	15	1.5	23	24.....	4	152	79	15	1.2	10	29
10.....	10	45	242	10	2	4.0	23	25.....	6	131	96	15	1.2	10	29
11.....	10	31	238	6	2	1.5	23	26.....	6	155	108	15	1.2	10	30
12.....	15	31	230	6	2	1.2	23	27.....	6	117	91	15	1.2	10	31
13.....	4	31	224	8	1.5	2	23	28.....	6	134	100	6	1.2	10	31
14.....	10	15	218	6	.5	3	23	29.....	6	200	91	5	1.5	10	31
15.....	10	31	172	18	.5	4	23	30.....	10	221	82	15	2.0	10	31
								31.....	221	45	2.0	31

NOTE.—Discharge determined from a rating curve not very well defined. Discharge interpolated for days for which missing gage heights are missing.

Monthly discharge of Cow Creek near Saratoga, Wyo., for 1912.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accu- racy.
	Maximum.	Minimum.	Mean.		
April.....	15	2	7.63	454	C.
May.....	221	6	78.7	4,840	C.
June.....	282	74	160	9,520	C.
July.....	82	5	23.7	1,460	C.
August.....	48	9.40	578	C.
September.....	23	1.2	7.15	425	C.
October.....	31	10	21.0	1,290	C.
The period.....	18,600	

SPRING CREEK NEAR SARATOGA, WYO.

Location.—At highway bridge about sec. 23, T. 17 N., R. 84 W., and 2 miles south-west of Saratoga. No tributary between the station and the mouth, three-fourths of a mile below.

Records available.—May 3, 1911, to October 31, 1912.

Drainage area.—Not measured.

Gage.—Vertical staff.

Channel.—Somewhat shifting.

Discharge measurements.—Made from bridge during high water and by wading at ordinary stages.

Winter flow.—Ice causes backwater during the winter months and discharge measurements are made to determine the approximate flow.

Diversions.—Prior to July 1, 1912, there were adjudicated diversions of 5 second-feet from Spring Creek, 85 second-feet from North Spring Creek, and 104 second-feet from South Spring Creek. These diversions are all above the station.

Accuracy.—Owing to the somewhat shifting channel the estimates of discharge can not be considered better than fair or, possibly, good.

Discharge measurements of Spring Creek near Saratoga, Wyo., for 1912.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		<i>Feet.</i>	<i>Sec.-ft.</i>			<i>Feet.</i>	<i>Sec.-ft.</i>
Jan. 29 ^a	R. H. Fletcher.....	2.00	16.3	July 16	R. H. Fletcher.....	1.00	23.7
Mar. 1 stdo.....	.80	20.3	Aug. 23do.....	.70	5.8
June 5do.....	4.00	653.	Oct. 19do.....	1.03	31.2

^a Relation of gage height to discharge affected by ice.

Daily gage height, in feet, of Spring Creek near Saratoga, Wyo., for 1912.

[Vada M. Lyons, observer.]

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
1.....		2.2	1.05	3.6	2.05	1.05	0.90	1.0
2.....		2.2	1.05	3.4	1.85	1.0	.90	1.0
3.....		2.0	1.05	3.4	1.65	1.0	.85	1.0
4.....		1.5	1.1	3.7	1.6	1.0	.86	1.0
5.....		1.4	1.1	4.0	1.65	.90	.82	1.0
6.....		1.4	1.1	3.9	1.45	.90	.84	1.1
7.....		1.3	1.1	3.6	1.35	.90	.82	1.1
8.....		1.25	1.1	4.0	1.25	.90	.75	1.1
9.....		1.1	1.2	4.1	1.15	.90	.70	1.1
10.....		1.05	1.15	4.0	1.1	.90	.86	1.1
11.....		1.0	1.5	3.8	1.1	.90	1.1
12.....		.90	1.3	3.8	1.05	.70	1.1
13.....		1.1	1.2	3.6	1.0	.60	1.1
14.....		1.05	1.2	3.4	1.05	.60	1.1
15.....		1.05	1.2	3.4	1.15	.65	1.0	1.0
16.....		1.05	1.3	3.8	1.0	.80	1.05	1.0
17.....		1.0	1.4	3.0	.90	.75	1.15	1.0
18.....		1.0	1.55	2.3	.85	.80	1.1	1.0
19.....		1.05	1.95	2.15	.95	.80	1.1	1.1
20.....		1.05	2.15	1.95	1.1	.80	1.1	1.1
21.....		1.0	2.2	1.9	1.1	.80	1.1	1.1
22.....		.95	2.5	1.9	1.1	.70	1.1	1.1
23.....		.95	2.25	2.05	1.05	.70	1.0	1.1
24.....		.95	2.3	2.1	1.0	.70	1.05	1.1
25.....		1.0	2.45	2.6	.90	.70	1.1	1.1
26.....		1.0	2.8	2.6	.90	.70	1.1	1.1
27.....		1.0	2.9	2.6	1.0	.70	1.1	1.1
28.....		1.0	2.8	2.45	.90	.70	1.1	1.1
29.....		1.0	2.8	2.45	.90	.70	1.0	1.1
30.....		2.3	2.8	2.35	.90	.95	1.0	1.2
31.....			3.5	1.05	.96	1.2

Daily discharge, in second-feet, of Spring Creek near Saratoga, Wyo., for 1912.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
1.....	215	32	535	187	32	16	26
2.....	215	32	485	150	26	16	26
3.....	177	32	485	116	26	12	26
4.....	91	37	565	107	26	13	26
5.....	76	37	655	116	16	10	26
6.....	76	37	625	84	16	12	37
7.....	62	37	535	69	16	10	37
8.....	56	37	655	56	16	7	37
9.....	37	49	685	43	16	5	37
10.....	32	43	655	37	16	13	37
11.....	26	91	595	37	16	15	37
12.....	16	62	595	32	5	17	37
13.....	37	49	535	26	3	20	37
14.....	32	49	485	32	3	23	37
15.....	32	49	485	43	4	26	26
16.....	32	62	595	26	9	32	26
17.....	26	76	387	16	7	43	26
18.....	26	99	235	12	9	37	26
19.....	32	168	206	21	9	37	37
20.....	32	206	163	37	9	37	37
21.....	26	215	159	37	9	37	37
22.....	21	276	159	37	5	37	37
23.....	21	225	186	32	5	26	37
24.....	21	235	196	26	5	32	37
25.....	26	266	297	16	5	37	37
26.....	26	341	297	16	5	37	37
27.....	26	364	297	26	5	37	37
28.....	26	341	266	16	5	37	37
29.....	26	341	266	16	5	26	37
30.....	26	341	245	16	21	26	49
31.....	510	32	22	49

NOTE.—Discharge determined from a rating curve well defined below 175 second-feet and fairly well defined between 175 and 700 second-feet. Mean discharge February and March estimated from two discharge measurements and climatologic data.

Monthly discharge of Spring Creek near Saratoga, Wyo., for 1912.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accu- racy.
	Maximum.	Minimum.	Mean.		
February.....	^a 15. 0	863	D.
March.....	^a 20. 0	1,230	D.
April.....	215	16	52. 4	3,120	B.
May.....	510	32	153	9,410	B.
June.....	685	159	418	24,900	C.
July.....	187	12	48. 9	3,010	B.
August.....	32	3	12	738	B.
September.....	43	5	24. 4	1,450	B.
October.....	49	26	34. 6	2,130	B.
The period.....	685	3	46,900	

^a Estimated.

JACK CREEK AT BLYDENBURGH'S RANCH, NEAR SARATOGA, WYO.

Location.—Six miles west of Saratoga, on the Rawlins-Encampment road, in secs. 11 and 12, T. 17 N., R. 8 W., sixth principal meridian, 6 miles above the old station near Saratoga. There are no intervening tributaries, but water is diverted for irrigation between the two stations.

Records available.—June 10 to October 31, 1912.

Drainage area.—Not measured.

Gage.—Vertical staff.

Channel.—Data too meager to determine.

Discharge measurements.—Made from highway bridge to which the gage is attached.

Winter flow.—No data.

Accuracy.—Owing to insufficient data estimates of flow can not be made.

Discharge measurements of Jack Creek at Blydenburgh's ranch near Saratoga, Wyo., in 1912.

Date.	Hydrographer.	Gage height.	Discharge.
		<i>Feet.</i>	<i>Sec.-ft.</i>
June 10	R. H. Fletcher	3.60	738
July 15do.....	1.80	31.6
Aug. 22do.....	1.24	6.3
Oct. 18do.....	1.50	12

Dail gage height, in feet, of Jack Creek at Blydenburgh's ranch, near Saratoga, Wyo., for 1912.

[Earl Fryer, observer.]

Day.	June.	July.	Aug.	Sept.	Oct.	Day.	June.	July.	Aug.	Sept.	Oct.
1		2.35	1.68	1.3	1.4	16	2.85	1.78	1.35	1.5	1.45
2		2.28	1.62	1.28	1.4	17	2.65	1.78	1.32	1.68	1.45
3		2.22	1.32	1.25	1.4	18	2.5	1.7	1.25	1.7	1.45
4		2.2	1.48	1.25	1.4	19	2.42	1.72	1.22	1.62	1.45
5		2.18	1.4	1.25	1.5	20	2.32	1.72	1.22	1.62	1.58
6		2.1	1.4	1.25	1.55	21	2.3	1.68	1.22	1.52	1.65
7		2.0	1.4	1.25	1.48	22	2.32	1.68	1.22	1.5	1.7
8		1.98	1.48	1.22	1.45	23	2.35	1.58	1.25	1.45	1.68
9		1.98	1.48	1.3	1.4	24	2.4	1.55	1.25	1.55	1.65
10	3.6	1.9	1.42	1.38	1.6	25	2.55	1.4	1.25	1.5	1.6
11	3.35	1.9	1.4	1.38	1.58	26	2.45	1.4	1.25	1.48	1.6
12	3.28	1.9	1.38	1.32	1.55	27	2.42	1.4	1.25	1.48	1.6
13	3.12	1.82	1.38	1.3	1.5	28	2.42	1.5	1.28	1.45	1.88
14	3.15	1.82	1.32	1.35	1.45	29	2.38	1.48	1.3	1.45	1.82
15	3.05	1.82	1.38	1.4	1.45	30	2.38	1.5	1.42	1.45	1.68
						31		1.78	1.38	-----	1.62

JACK CREEK NEAR SARATOGA, WYO.

Location.—At Burdick's ranch, in sec. 28, T. 18 N., R. 84 W., about 5 miles northwest of Saratoga. No tributary between the station and the mouth, 1 mile below nor for a distance of several miles above.

Records available.—April 26, 1911, to July 31, 1912.

Drainage area.—Not measured.

Gage.—Vertical staff.

Channel.—Apparently permanent.

Discharge measurements.—Made from private bridge.

Winter flow.—Ice causes backwater during the winter months and discharge measurements are made to determine the approximate flow.

Diversions.—Prior to July 1, 1912, there were adjudicated diversions from Jack Creek of 92 second-feet. These diversions are all above the station.

Accuracy.—Conditions are favorable for accurate results and the estimates are considered reliable.

Discharge measurements of Jack Creek near Saratoga, Wyo., in 1912.

Date.	Hydrographer.	Gage height.	Dis-charge.
Jan. 29 ^a	R. H. Fletcher	<i>Feet.</i> 3.00	<i>Sec.-ft.</i> 8.2
Mar. 18 ^ado.....
June 10do.....	3.50	291

^a Relation of gage height to discharge affected by ice. Measurement taken at open section about one-fourth mile below gage. Stream frozen over at gage.

Daily gage height, in feet, and discharge, in second-feet, of Jack Creek near Saratoga, Wyo., for 1912.

[Mrs. A. E. Dahl, observer.]

Day.	April.		May.		June.		July.	
	Gage height.	Dis-charge.	Gage height.	Dis-charge.	Gage height.	Dis-charge.	Gage height.	Dis-charge.
1			1.65	45	3.5	291	1.8	58
2			1.65	45	3.4	273	1.7	49
3			1.85	62	3.4	273	1.6	41
4			1.9	67	3.5	291	1.6	41
5			1.7	49	3.5	291	1.6	41
6	1.8	58	1.7	49	3.5	291	1.55	38
7	1.7	49	1.65	45	3.4	273	1.4	27
8	1.8	58	1.9	67	3.3	256	1.3	21
9	1.8	58	2.3	111	3.3	256	1.25	18
10	1.8	58	2.7	163	3.5	291	1.12	12
11	1.7	49	2.6	149	3.4	273	1.1	11
12	1.65	45	2.5	136	3.2	239	1.12	12
13	1.6	41	2.2	99	3.0	207	1.02	8
14	1.5	34	1.85	62	2.9	192	8
15	1.45	30	1.9	67	2.9	192	7
16	1.5	34	2.1	88	2.7	163	6
17	1.6	41	2.6	149	2.4	123	5
18	1.6	41	2.9	192	2.15	94	.90	4
19	1.6	41	3.2	239	2.0	77	.90	4
20	1.55	38	3.4	273	1.9	67	5
21	1.5	34	3.4	273	1.7	49	.95	6
22	1.4	27	3.4	273	1.75	54	.90	4
23	1.4	27	3.4	273	1.8	58	.85	3
24	1.4	27	3.2	239	1.8	58	.80	2
25	1.5	34	3.3	256	1.95	72	.85	3
26	1.65	45	3.4	273	1.95	72	.90	4
27	1.6	41	3.4	273	1.9	67	.90	4
28	1.5	34	3.3	256	1.85	62	.90	4
29	1.55	38	3.2	239	1.8	58	.90	4
30	1.75	54	3.3	256	1.8	58	1.0	7
31			3.5	291	1.0	7

NOTE.—Discharge determined from a well-defined rating curve. Mean discharge February and March estimated from two measurements.

Monthly discharge of Jack Creek near Saratoga, Wyo., for 1912.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accu- racy.
	Maximum.	Minimum.	Mean.		
February.....			^a 7	403	D.
March.....			^a 14	861	D.
April 6-30.....	58	27	41.4	2,050	B.
May.....	291	45	163	10,000	B.
June.....	291	49	167	9,940	B.
July.....	58	2	15	922	B.
The period.....				24,200	

^a Estimated.

MEDICINE BOW RIVER NEAR MEDICINE BOW, WYO.

Location.—At Johnson's ranch, in sec. 7, T. 20 N., R. 79 W., 14 miles southwest of Medicine Bow. The nearest tributary enters 3 miles below.

Records available.—June 4, 1911, to November 30, 1912.

Drainage area.—Not measured.

Gage.—Vertical staff.

Channel.—Shifting after high water.

Discharge measurements.—Made from bridge and by wading.

Winter flow.—Ice causes backwater during the winter months and the records are discontinued.

Diversions.—Prior to July 1, 1912, there were adjudicated diversions from Medicine Bow River of 230 second-feet, most of which are above the station.

Accuracy.—Although there was a shift in the channel after the high water of 1912, sufficient discharge measurements have been made to make the estimates reliable, with the exception of the estimates from June 3 to July 14, during which dates the change occurred. These latter estimates may be 10 per cent or more in error.

Cooperation.—Station maintained in cooperation with Johnson & Crownberg.

Discharge measurements of Medicine Bow River near Medicine Bow, Wyo., in 1912.

Date.	Hydrographer.	Gage height.	Dis- charge.	Date.	Hydrographer.	Gage height.	Dis- charge.
June 3	R. H. Fletcher	<i>Feet.</i> 7.60	<i>Sec.-ft.</i> 1,030	Aug. 21	R. H. Fletcher	<i>Feet.</i> 5.62	<i>Sec.-ft.</i> 30.4
July 14do.....	6.85	463	Oct. 17do.....	5.84	48.5
24	Robert Follansbee.....	5.90	69.7				

Daily gage height, in feet, of Medicine Bow River near Medicine Bow, Wyo., for 1912.

[Mrs. S. W. Johnson, observer.]

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1.....		5.95	7.4	8.0	6.5	5.55	5.65	5.77
2.....		6.0	7.4	8.0	6.4	5.65	5.65	5.75
3.....		6.0	7.6	7.9	6.3	5.55	5.65	5.8
4.....		5.95	7.6	7.7	6.15	5.4	5.65	5.83
5.....		5.95	7.7	7.6	6.0	5.35	5.75	5.85
6.....		6.05	7.8	7.45	5.9	5.35	5.85	5.85
7.....	6.3	6.15	7.8	7.25	5.85	5.35	5.85	5.85
8.....	6.3	6.25	8.0	7.0	5.95	5.35	5.85	5.85
9.....	6.3	6.4	8.0	6.75	5.95	5.5	5.85	5.85
10.....	6.25	6.6	8.0	6.6	5.9	5.7	5.85	5.85

Daily gage height, in feet, of Medicine Bow River near Medicine Bow, Wyo., for 1912—
Continued.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
11.....	6.25	6.7	8.0	6.5	5.8	5.8	5.85	5.85
12.....	6.4	6.65	7.8	6.5	5.65	5.7	5.85	5.8
13.....	6.15	6.6	7.8	6.55	5.65	5.7	5.85	5.8
14.....	6.1	6.55	7.6	6.8	5.65	5.9	5.8	5.8
15.....	6.05	6.5	7.5	7.0	5.6	5.9	5.78	5.75
16.....	6.0	6.5	7.35	7.05	5.6	5.9	5.7	5.75
17.....	6.0	6.5	7.25	7.0	5.6	5.8	5.68	5.65
18.....	5.95	6.55	7.15	6.9	5.65	5.8	5.65	5.65
19.....	5.9	6.55	7.1	6.85	5.65	5.8	5.65	5.65
20.....	5.9	6.55	7.05	6.75	5.65	5.75	5.7	5.65
21.....	5.9	6.6	7.1	6.75	5.6	5.7	5.68	5.65
22.....	5.8	6.6	7.1	6.6	5.6	5.7	5.65	5.65
23.....	5.8	6.7	7.15	6.3	5.6	5.9	5.72	5.65
24.....	5.8	6.7	7.4	5.9	5.6	5.9	5.85
25.....	5.8	6.75	7.6	5.8	5.45	5.9	5.85
26.....	5.8	6.8	7.9	5.9	5.25	5.8	5.85
27.....	5.8	6.85	7.8	6.0	5.25	5.75	5.85
28.....	5.85	6.95	7.8	5.9	5.45	5.7	5.85
29.....	5.9	7.05	7.7	5.95	5.65	5.7	5.85
30.....	5.95	7.15	7.9	6.1	5.65	5.7	5.82
31.....	7.3	6.45	5.65	5.8

Daily discharge, in second-feet, of Medicine Bow River near Medicine Bow, Wyo., for 1912.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1.....	218	928	1,260	285	26	34	46
2.....	238	928	1,260	240	26	34	44
3.....	238	1,040	1,180	195	26	34	49
4.....	218	1,040	1,020	136	17	34	54
5.....	218	1,090	950	88	14	44	56
6.....	260	1,150	845	64	14	56	56
7.....	372	304	1,150	712	56	14	56	56
8.....	372	349	1,260	555	76	14	56	56
9.....	372	419	1,260	412	76	23	56	56
10.....	349	516	1,260	335	64	38	56	56
11.....	349	566	1,260	285	49	49	56	56
12.....	419	541	1,150	285	34	38	56	49
13.....	304	516	1,150	315	34	38	56	49
14.....	281	491	1,040	440	34	64	49	49
15.....	260	467	982	555	30	64	46	44
16.....	238	467	902	585	30	64	38	44
17.....	238	467	848	555	30	49	37	34
18.....	218	491	796	496	34	49	34	34
19.....	197	491	770	468	34	49	34	34
20.....	197	491	744	412	34	44	38	34
21.....	197	516	770	412	30	38	37	34
22.....	158	516	770	335	30	38	34	34
23.....	158	566	796	195	30	64	40	34
24.....	158	566	928	64	30	64	56	30
25.....	158	591	1,040	49	20	64	56	30
26.....	158	616	1,200	64	10	49	56	30
27.....	158	642	1,150	88	10	44	56	30
28.....	178	692	1,150	64	20	38	56	30
29.....	197	744	1,090	76	34	38	56	30
30.....	218	796	1,200	118	34	38	52	30
31.....	875	262	34	49

NOTE.—Discharge determined from well-defined rating curves as follows: Apr. 8 to June 30 and July 1 to Nov. 23. Discharge Nov. 24-30 estimated at 30 second-feet.

Monthly discharge of Medicine Bow River near Medicine Bow, Wyo., for 1912.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accu- racy.
	Maximum.	Minimum.	Mean.		
April 7-30.....	419	158	246	11,700	B.
May.....	875	218	437	29,900	B.
June.....	1,260	744	1,030	61,300	B.
July.....	1,260	49	473	29,100	C.
August.....	285	10	61.5	3,780	B.
September.....	64	14	39.8	2,370	B.
October.....	56	34	46.8	2,880	B.
November.....	56	30	42.3	2,520	B.
The period.....				144,000	

ROCK CREEK NEAR ARLINGTON, WYO.

Location.—At highway bridge in sec. 25, T. 19 N., R. 79 W., $1\frac{1}{2}$ miles upstream from Arlington post office; 1 mile below the mouth of Overland Creek, the nearest tributary.

Records available.—April 22, 1911, to December 31, 1912.

Drainage area.—70 square miles (measured from Forest Atlas).

Gage.—Vertical staff. In July, 1912, an automatic recording gage referred to the same datum was installed by the Rock Creek Conservation Co.

Channel.—Shifting.

Discharge measurements.—Made from bridge.

Winter flow.—Ice causes backwater during the winter months.

Diversions.—One small ditch diverts water above the station for irrigation.

Accuracy.—As the channel shifts, the estimates have been obtained by the indirect method and can be considered only approximate.

Cooperation.—Station maintained in cooperation with the Rock Creek Conservation Co.

Discharge measurements of Rock Creek near Arlington, Wyo., in 1912.

Date.	Hydrographer.	Gage height.	Dis-charge.	Date.	Hydrographer.	Gage height.	Dis-charge.
		<i>Feet.</i>	<i>Sec.-ft.</i>			<i>Feet.</i>	<i>Sec.-ft.</i>
June 1	R. H. Fletcher.....	2.90	571	Aug. 20	R. H. Fletcher.....	1.50	43.4
11do.....	4.20	1,180	Oct. 16do.....	1.45	30
July 11do.....	2.70	391	Sept. 21	F. T. Cummings.....	1.50	48.3
24	F. T. Cummings.....	2.10	134	Nov. 25do.....	1.60	35.1

Daily gage height, in feet, of Rock Creek near Arlington, Wyo., for 1912.

[W. A. McIntyre, observer.]

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1.....	1.0	1.2	2.85	3.55	2.32	1.5	1.69	1.49	1.53
2.....	1.1	1.3	3.1	3.4	2.25	1.53	1.65	1.53	1.59
3.....	1.1	1.2	3.6	3.15	2.18	1.54	1.65	1.54	1.78
4.....	1.1	1.4	3.9	3.0	2.1	1.47	1.86	1.54	1.87
5.....	1.1	1.1	4.0	3.0	2.0	1.4	1.83	1.55	1.74
6.....	1.1	1.0	3.8	3.0	1.95	1.47	1.66	1.53	1.72
7.....	1.1	1.3	3.85	3.05	1.95	1.46	1.62	1.53	1.70
8.....	1.1	1.3	3.9	3.0	1.9	1.47	1.65	1.53	1.75
9.....	1.4	1.4	3.8	3.0	1.95	1.43	1.52	1.52	1.79
10.....	1.4	1.5	3.65	3.0	1.94	1.49	1.44	1.53	1.77

Daily gage height, in feet, of Rock Creek near Arlington, Wyo., for 1912—Continued.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
11.....	1.5	1.5	-----	2.82	1.93	1.58	1.42	1.54	1.78
12.....	1.1	1.3	3.9	2.95	1.93	1.58	1.49	1.50	1.62
13.....	1.0	1.3	3.7	2.8	1.88	1.47	1.28	1.45	1.54
14.....	1.2	1.5	3.5	3.15	1.85	1.44	1.2	1.45	1.51
15.....	1.1	1.3	3.3	2.8	1.81	1.49	1.65	1.45	1.58
16.....	1.1	1.3	3.15	2.65	1.8	1.52	1.54	1.45	1.67
17.....	1.3	1.5	3.0	2.55	1.79	1.54	1.53	1.45	1.76
18.....	1.4	1.8	2.6	2.58	1.76	1.59	1.46	1.45	1.94
19.....	1.2	1.8	2.95	2.62	1.75	1.71	1.52	1.45	-----
20.....	1.0	1.9	3.15	2.5	1.55	1.61	1.51	-----	-----
21.....	1.4	2.0	3.2	2.5	1.41	1.52	1.48	-----	-----
22.....	1.0	2.2	3.85	2.35	1.41	1.53	1.52	-----	-----
23.....	1.0	2.2	3.9	2.2	1.42	1.52	1.49	-----	-----
24.....	1.1	2.2	3.9	2.1	1.44	1.49	1.52	-----	-----
25.....	1.1	2.3	3.95	2.05	1.45	1.52	1.51	1.60	-----
26.....	1.1	2.5	3.9	2.0	1.46	1.51	1.49	1.61	-----
27.....	1.2	2.6	3.85	2.15	1.45	1.45	1.49	1.73	-----
28.....	1.1	2.6	3.85	2.12	1.46	1.49	1.49	1.79	-----
29.....	1.3	2.6	3.9	2.12	1.47	1.51	1.49	1.65	1.91
30.....	1.5	3.0	3.85	2.35	1.57	1.55	1.49	1.60	2.17
31.....	-----	-----	-----	2.42	1.56	-----	1.49	-----	2.32

NOTE.—Gage heights Dec. 1-31 affected by ice.

Daily discharge, in second-feet, of Rock Creek near Arlington, Wyo., for 1912.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1.....	10	18	540	810	185	47	60	30
2.....	13	26	680	720	170	52	53	35
3.....	13	18	990	590	150	53	53	35
4.....	13	35	1,120	540	135	43	85	35
5.....	13	13	1,190	540	115	35	82	36
6.....	13	10	1,010	540	105	43	56	35
7.....	13	26	1,040	565	105	42	50	35
8.....	13	26	1,080	540	110	43	53	35
9.....	35	35	1,010	540	120	38	38	33
10.....	35	46	830	540	118	46	29	35
11.....	46	46	1,080	450	115	61	27	35
12.....	13	26	990	510	115	61	35	31
13.....	10	26	860	465	110	43	17	27
14.....	18	46	730	620	105	40	11	27
15.....	13	26	620	415	95	46	53	27
16.....	13	26	540	350	93	50	41	20
17.....	26	46	470	305	91	53	40	20
18.....	35	102	300	320	85	47	32	20
19.....	18	102	490	310	84	61	38	20
20.....	10	125	590	265	55	50	37	22
21.....	35	150	610	265	37	38	34	25
22.....	10	210	1,000	215	37	40	38	27
23.....	10	210	1,030	155	38	38	35	30
24.....	13	210	1,030	135	40	35	38	32
25.....	13	245	1,070	122	41	38	37	35
26.....	13	325	1,030	112	42	37	35	37
27.....	18	375	1,000	145	41	31	35	57
28.....	13	375	1,000	140	42	35	35	63
29.....	26	375	1,030	140	43	37	35	43
30.....	46	630	1,030	195	57	41	35	35
31.....	-----	585	-----	215	56	-----	35	-----

NOTE.—Discharge determined by the indirect method for shifting channels. Discharge interpolated for days for which gage heights are missing. Mean discharge December estimated.

Monthly discharge of Rock Creek near Arlington, Wyo., for 1912.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accu- racy.
	Maximum.	Minimum.	Mean.		
April.....	46	10	19	1,130	D.
May.....	630	10	146	9,000	D.
June.....	1,190	300	866	51,500	D.
July.....	810	112	380	23,400	D.
August.....	185	37	88.2	5,420	D.
September.....	61	31	44.1	2,620	D.
October.....	85	11	41.4	2,550	D.
November.....	63	20	32.6	1,940	D.
December.....			30	1,840	D.
The period.....				99,400	

^a Estimated.**ROCK CREEK NEAR ROCK RIVER, WYO.**

Location.—At Phelan's ranch, in sec. 6, T. 20 N., R. 76 W., 1 mile southeast of Rock River. No important tributary between the station and the mouth, several miles below.

Records available.—March 25, 1911, to November 17, 1912.

Drainage area.—Not measured.

Gage.—Vertical staff. In July, 1912, an automatic recording gage referred to the same datum was installed by the Rock Creek Conservation Co.

Channel.—Shifting.

Discharge measurements.—Made from private bridge during high water and by wading at ordinary stages.

Winter flow.—Ice causes backwater during the winter months and discharge measurements are made to determine the approximate flow.

Diversions.—Prior to July 1, 1912, there were adjudicated diversions from Rock Creek of 232 second-feet and from tributaries 73 second-feet, chiefly above the station.

Accuracy.—As the channel shifts, the estimates have been obtained by the indirect method and can be considered only fair.

Cooperation.—Station maintained in cooperation with the Rock Creek Conservation Co.

Discharge measurements of Rock Creek near Rock River, Wyo., in 1912.

Date.	Hydrographer	Gage height.	Dis-charge.	Date.	Hydrographer.	Gage height.	Dis-charge.
		<i>Feet.</i>	<i>Sec.-ft.</i>			<i>Feet.</i>	<i>Sec.-ft.</i>
Jan. 30 ^a	R. H. Fletcher.....	9.9	Aug. 20	R. H. Fletcher.....	0.72	15
Mar. 20 ^ado.....	15.9	Oct. 1	F. T. Cummings.....	0.90	33.6
June 1do.....	2.30	432	Oct. 16do.....	1.10	60
July 12do.....	1.70	175				

^a Ice frozen solid to bottom at gage. Gage height estimated as 1 foot. Measurement made about one-fourth mile downstream from gage. Section open on Jan. 30, frozen over on Mar. 20, and measurement made under ice cover.

Daily gage height, in feet, of Rock Creek near Rock River, Wyo., for 1912.

[E. E. Clark, observer.]

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1.		1.1	1.8	2.5	1.15	0.60	0.85	0.95
2.		1.0	2.3	2.0	1.12	.58	.85	.95
3.		1.0	2.4	2.0	.98	.54	.89	.95
4.		1.0	3.95	1.9	.90	.55	.94	.95
5.		1.0	3.7	1.8	.85	.49	.95	.95
6.		1.0	3.7	1.8	.82	.46	.90	.95
7.		1.0	3.8	1.8	.82	.49	.93	.95
8.		1.0	3.7	1.9	.88	.50	.90	.95
9.		1.1	3.7	1.8	.88	.48	.92	.95
10.		1.2	3.7	1.6	.88	.78	1.02	.95
11.		1.2	3.5	1.6	.85	.85	1.04	.95
12.		1.3	3.3	1.6	.85	.87	1.07	.95
13.		1.3	2.8	1.6	.82	.83	1.02	.94
14.	1.3	1.2	2.3	1.6	.82	.86	1.0	.82
15.	1.2	1.2	2.3	1.62	.85	.96	1.0	.90
16.	1.3	1.2	2.2	1.6	.88	1.08	1.02	.87
17.	1.3	1.2	2.2	1.4	.85	1.15	1.05	.85
18.	1.2	1.2	2.0	1.32	.85	1.12	1.02
19.	1.2	1.2	1.9	1.32	.80	1.1	1.03
20.	1.2	1.2	1.9	1.3	.73	1.04	1.05
21.	1.1	1.3	1.85	1.2	.63	1.05	1.02
22.	1.2	1.4	2.2	1.05	.60	1.08	1.0
23.	1.2	1.5	2.8	1.0	.60	1.13	1.04
24.	1.2	1.7	3.2	.98	.55	.96	1.02
25.	1.1	1.7	3.2	.92	.59	.83	1.03
26.	1.3	1.7	3.2	.85	.62	.86	1.05
27.	1.3	1.8	3.2	.90	.60	.86	1.09
28.	1.2	1.8	3.0	.92	.61	.82	1.03
29.	1.2	2.0	2.8	.92	.63	.81	.97
30.	1.1	2.0	2.5	.98	.64	.83	.95
31.		2.0		1.12	.6595

Daily discharge, in second-feet, of Rock Creek near Rock River, Wyo., for 1912.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1		85	260	485	64	5	26	37
2		70	440	295	60	4	26	37
3		70	480	265	41	3	30	37
4		70	1,220	235	31	4	36	37
5		70	1,100	205	25	2	37	37
6		70	1,100	205	22	1	31	37
7		70	1,150	205	22	2	35	37
8		70	1,100	235	29	2	31	37
9		85	1,100	205	29	2	33	37
10		105	1,100	150	29	18	46	37
11		105	960	150	25	25	49	37
12		125	860	150	25	28	52	37
13		125	615	150	22	23	46	36
14	125	105	405	150	22	27	43	22
15	105	105	405	155	25	38	43	31
16	125	105	365	150	29	54	46	28
17	125	105	365	110	25	64	50	26
18	105	105	295	94	25	60	46
19	105	105	260	94	20	57	47
20	105	105	260	90	14	49	50
21	85	125	245	72	7	50	46
22	105	150	365	50	5	54	43
23	105	175	615	43	5	62	49
24	105	230	810	41	4	38	46
25	85	230	810	33	5	23	47
26	125	230	810	25	6	27	50
27	125	260	810	31	5	27	56
28	105	260	710	33	6	22	47
29	105	325	615	33	7	21	39
30	85	325	485	41	7	23	37
31		325	60	8	37

NOTE.—Discharge determined by indirect method for shifting channels. Mean discharge February and March estimated from two measurements and climatologic data.

Monthly discharge of Rock Creek near Rock River, Wyo., for 1912.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accu- racy.
	Maximum.	Minimum.	Mean.		
February.....			a 8.0	460	D.
March.....			a 14.0	861	D.
April 14-30.....	125	85	107	3,610	C.
May.....	325	70	145	8,920	C.
June.....	1,220	260	670	39,900	C.
July.....	455	25	137	8,420	C.
August.....	64	4	20.9	1,290	C.
September.....	64	1	27.1	1,610	C.
October.....	56	26	41.9	2,580	C.
November 1-17.....	37	22	34.5	1,160
The period.....				68,900	

a Estimated.

LARAMIE RIVER AT GLENDEVEY, COLO.

Location.—At highway bridge, one-eighth mile west of Glendevy, in sec. 36, T. 10 N., R. 76 W., in the Medicine Bow National Forest. McIntyre Creek enters a short distance below and Spring Creek above.

Records available.—June 24, 1904, to October 31, 1905; August 18, 1910, to November 30, 1912.

Drainage area.—102 square miles (measured from Gleason's 1911 sectional map of Colorado).

Gage.—Automatic gage installed by the State engineer November 17, 1910, replaced vertical staff previously used; datum of gages unchanged.

Channel.—Practically permanent.

Discharge measurements.—Made from cable at bridge during high water and by wading at ordinary stages.

Winter flow.—Ice causes backwater during the winter months.

Diversions.—There are court decrees for diversions of 65 second-feet from Laramie River above the station and for 749 second-feet from tributaries entering above. Of this latter amount, 688 second-feet are for diversion into the Cache la Poudre basin.

Cooperation.—Computed estimates for 1912 furnished by the State engineer.

Discharge measurements of Laramie River at Glendevy, Colo., in 1912.

Date.	Hydrographer.	Gage height.	Dis- charge.	Date.	Hydrographer.	Gage height.	Dis- charge.
		<i>Feet.</i>	<i>Sec.-ft.</i>			<i>Feet.</i>	<i>Sec.-ft.</i>
May 11	C. E. Turner.....	2.25	72	July 24	M. E. Bunger.....	2.70	170
June 16	M. E. Bunger.....	3.20	340	Aug. 16do.....	2.25	69
July 14do.....	3.40	426	Sept. 27do.....	2.05	39
20do.....	3.00	291				

Daily gage height, in feet, of Laramie River at Glendevey, Colo., for 1912.

[A. L. Fairhurst, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1.....		1.75	1.8	1.65	2.0	3.65	3.75	2.6	2.05	2.1	1.9
2.....	1.9	1.8	1.8	1.6	2.1	3.75	3.5	2.5	1.95	2.05	1.95
3.....	1.8	1.8	1.75	1.6	2.1	4.1	3.4	2.45	1.9	2.05	2.0
4.....	1.7	1.7	1.75	1.65	2.05	4.25	3.3	2.3	2.0	2.2	1.95
5.....	1.9	1.75	1.75	1.7	2.0	4.25	3.35	2.2	1.95	2.2	1.9
6.....	1.9	1.75	1.75	1.65	2.0	4.2	3.25	2.2	1.95	2.05	1.9
7.....	2.05	1.75	1.8	1.6	2.05	4.2	3.2	2.15	2.0	2.0	1.9
8.....	1.9	1.7	1.75	1.65	2.15	4.2	2.95	2.2	1.95	2.05	1.8
9.....	1.85	1.7	1.75	1.75	2.25	4.15	2.95	2.2	1.9	2.05	1.95
10.....	1.75	1.75	1.75	1.9	2.1	4.05	2.9	2.25	1.9	2.05	2.0
11.....	1.7	1.75	1.75	1.95	2.15	3.85	2.9	2.15	1.9	2.0	1.95
12.....	1.7	1.7	1.75	2.0	2.1	3.75	3.0	2.1	1.9	1.95	1.8
13.....	1.65	1.75	1.75	1.95	2.0	3.75	3.2	2.05	1.9	1.9	1.85
14.....	1.6	1.75	1.75	1.85	2.1	3.7	3.35	1.95	1.85	1.9	1.9
15.....	1.65	1.75	1.85	1.8	2.15	3.5	3.0	2.0	1.9	1.9	1.9
16.....	1.8	1.75	1.75	1.8	2.35	3.3	2.9	2.1	2.05	1.95	1.8
17.....	1.8	1.7	1.7	1.75	2.5	3.15	2.85	2.1	2.1	2.0	1.8
18.....	1.75	1.7	1.7	1.7	2.6	3.1	2.8	2.1	2.15	2.05	1.9
19.....	1.75	1.75	1.8	1.75	2.75	3.05	2.85	2.05	2.2	2.1	2.05
20.....	1.7	1.75	1.75	1.75	3.0	3.05	3.0	2.05	2.2	2.1	1.9
21.....	1.65	1.75	1.9	1.7	3.1	3.05	2.85	2.05	2.1	2.1	1.85
22.....	1.7	1.7	2.05	1.65	3.2	3.15	2.75	1.95	2.1	2.05	1.85
23.....	1.75	1.8	1.9	1.65	3.35	3.35	2.8	2.0	2.15	2.05	1.9
24.....	1.8	1.75	1.75	1.85	3.4	3.55	2.75	2.0	2.0	2.05	1.9
25.....	1.85	1.75	1.8	1.9	3.5	3.6	2.65	1.95	2.0	2.0	1.85
26.....	1.9	1.75	1.75	1.85	3.6	3.55	2.7	1.95	2.05	2.0	1.8
27.....	1.95	1.75	1.7	1.9	3.4	3.75	2.65	1.95	2.1	2.0	1.8
28.....	1.85	1.7	1.75	2.0	3.3	3.75	2.6	2.1	2.1	1.95
29.....	1.8	1.75	1.85	2.05	3.45	3.75	2.5	2.15	2.05	1.95
30.....	1.8	1.8	2.0	3.7	3.75	2.7	2.15	2.05	1.95
31.....	1.75	1.75	3.75	2.6	2.2	1.9

Daily discharge, in second-feet, of Laramie River at Glendevey, Colo., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1.....	26	16	19	12	36	524	568	142	40	46	25
2.....	26	19	19	10	49	568	460	117	30	40	30
3.....	19	19	16	10	49	727	420	106	25	40	34
4.....	14	14	16	12	42	798	380	76	34	60	30
5.....	26	16	16	14	36	798	400	60	30	60	25
6.....	26	16	16	12	36	774	361	60	30	40	25
7.....	42	16	19	10	42	774	342	53	34	34	25
8.....	26	14	16	12	57	774	250	60	30	40	19
9.....	22	14	16	16	74	750	250	60	25	40	30
10.....	16	16	16	26	49	704	232	68	25	40	34
11.....	14	16	16	31	57	612	232	53	25	34	30
12.....	14	14	16	36	50	568	268	46	25	30	19
13.....	12	16	14	31	38	568	342	40	25	25	22
14.....	10	16	16	22	49	546	400	30	22	25	25
15.....	12	16	22	19	56	460	274	34	25	25	25
16.....	19	16	16	19	89	380	240	46	40	30	19
17.....	19	14	14	16	122	323	228	46	46	34	19
18.....	16	14	14	14	146	304	214	46	53	40	25
19.....	16	16	19	16	190	286	234	40	60	46	40
20.....	14	16	16	16	272	286	292	40	60	46	25
21.....	12	16	26	14	308	286	230	40	46	46	22
22.....	14	14	42	12	347	323	194	30	46	40	22
23.....	16	19	26	12	406	400	206	34	53	40	25
24.....	19	16	16	22	424	482	185	34	34	40	25
25.....	22	16	19	26	464	503	156	30	34	34	22
26.....	26	16	16	22	508	482	170	30	40	34	19
27.....	31	16	14	26	424	568	156	30	46	34	19
28.....	22	14	16	36	382	568	142	46	46	30	20
29.....	19	16	22	42	444	568	117	53	40	30	20
30.....	19	19	36	548	568	170	53	40	30	20
31.....	16	16	568	142	60	25

Monthly discharge of Laramie River at Glendevy, Colo., for 1912.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
January.....	42	10	19.5	1,200
February.....	19	14	15.8	909
March.....	42	14	18.2	1,120
April.....	42	10	20	1,190
May.....	568	36	205	12,600
June.....	798	286	542	32,300
July.....	568	117	266	16,400
August.....	142	30	53.7	3,300
September.....	60	22	37.0	2,200
October.....	60	25	37.4	2,300
November.....	40	19	24.7	1,470
The period.....				75,000

NOTE.—The above records have been changed slightly to conform with the computing rules of the United States Geological Survey.

LARAMIE RIVER NEAR JELM, WYO.

Location.—At highway bridge, in sec. 15, T. 12 N., R. 77 W., 4 miles south of Jelm post office, one-fourth mile below the Colorado-Wyoming line.

Records available.—May 7, 1911, to November 30, 1912. From June 22, 1904, to October 31, 1905, a station was maintained at Decker's ranch, one-half mile south of the State line. The records at the two stations are practically comparable, as there are no tributaries nor diversions of any amount between.

Drainage area.—365 square miles (Clason's 1911 sectional map of Colorado).

Gage.—In 1911 an automatic recording gage was installed by the State engineer of Colorado. This gage is referred to the same datum as the vertical staff used at first.

Channel.—Practically permanent.

Discharge measurements.—Made from bridge.

Winter flow.—Ice causes backwater during the winter months and the records are discontinued.

Diversions.—Between this station and that at Glendevy, Colo., there are court decrees for diversions of 236 second-feet from Laramie River and 204 second-feet from intervening tributaries. These diversions are all in Colorado.

Accuracy.—Conditions are favorable for accurate results and the estimates should be excellent.

Cooperation.—Station maintained in cooperation with the State engineer of Colorado, by whom the data have been furnished as published.

Discharge measurements of Laramie River near Jelm, Wyo., in 1912.

Date.	Hydrographer.	Gage height.	Dis-charge.	Date.	Hydrographer.	Gage height.	Dis-charge.
		<i>Feet.</i>	<i>Sec.-ft.</i>			<i>Feet.</i>	<i>Sec.-ft.</i>
May 11	C. E. Turner.....	1.48	147	Aug. 13	M. E. Bunger.....	1.40	110
June 17	M. E. Bunger.....	2.78	841	16	do.....	1.50	150
July 18	do.....	2.20	405	Sept. 26	do.....	1.28	92
25	R. Follansbee.....	1.88	299				

Daily gage height, in feet, of Laramie River near Jelm, Wyo., for 1912.

[Mrs. C. D. Oviatt, observer.]

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1.....		1.35	3.35	3.20	1.90	1.25	1.25	1.20
2.....		1.40	3.40	2.95	1.70	1.20	1.25	1.20
3.....		1.45	3.55	2.80	1.65	1.20	1.30	1.15
4.....		1.35	3.65	2.75	1.60	1.15	1.35	1.15
5.....		1.30	3.65	2.85	1.50	1.10	1.35	1.15
6.....		1.20	3.65	2.65	1.50	1.15	1.30	1.15
7.....		1.30	3.60	2.50	1.45	1.10	1.30	1.15
8.....		1.45	3.55	2.40	1.65	1.10	1.30	1.05
9.....		1.55	3.55	2.45	1.55	1.10	1.25	1.15
10.....		1.55	3.55	2.40	1.45	1.15	1.30	1.20
11.....		1.55	3.45	2.40	1.40	1.20	1.25	1.10
12.....	1.45	1.60	3.35	2.55	1.35	1.15	1.20	1.00
13.....	1.35	1.65	3.35	2.60	1.35	1.15	1.15	1.00
14.....	1.20	1.70	3.30	2.65	1.30	1.20	1.15	1.10
15.....	1.10	1.75	3.10	2.50	1.35	1.25	1.15	1.10
16.....	1.05	1.85	2.90	2.40	1.45	1.30	1.20
17.....	1.10	2.00	2.75	2.30	1.40	1.30	1.25	.95
18.....	1.15	2.10	2.65	2.25	1.35	1.30	1.25	1.05
19.....	1.25	2.30	2.60	2.20	1.30	1.35	1.30	1.15
20.....	1.20	2.45	2.60	2.30	1.30	1.45	1.25	1.15
21.....	1.10	2.50	2.65	2.15	1.25	1.30	1.10	1.00
22.....	1.00	2.60	2.75	2.05	1.20	1.25	1.15	1.05
23.....	.95	2.70	2.90	2.00	1.25	1.30	1.20	1.05
24.....	1.15	2.80	3.05	2.00	1.20	1.25	1.15	1.05
25.....	1.15	2.90	3.10	1.90	1.20	1.20	1.20	1.05
26.....	1.15	3.10	3.05	1.90	1.15	1.25	1.25	1.00
27.....	1.15	3.00	3.20	1.95	1.10	1.30	1.30	.95
28.....	1.15	2.80	3.25	1.85	1.15	1.25	1.20
29.....	1.25	2.95	3.20	1.75	1.20	1.25	1.20
30.....	1.30	3.40	3.15	1.75	1.25	1.25	1.20
31.....		3.50	1.90	1.30	1.20

Daily discharge, in second-feet, of Laramie River near Jelm, Wyo., for 1912.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1.....		109	1,390	1,250	290	86	86	76
2.....		122	1,435	1,018	217	76	86	76
3.....		134	1,578	875	198	76	97	66
4.....		109	1,670	828	180	66	110	66
5.....		97	1,670	923	150	57	110	66
6.....		76	1,670	735	150	66	97	66
7.....		97	1,625	605	132	57	97	66
8.....		134	1,578	530	190	57	97	50
9.....		162	1,578	568	158	57	86	66
10.....		162	1,578	530	128	66	97	76
11.....		162	1,483	530	115	76	86	57
12.....	134	177	1,390	648	100	66	76	43
13.....	109	193	1,390	690	100	66	66	43
14.....	76	210	1,345	735	92	76	66	57
15.....	57	226	1,155	605	105	86	66	57
16.....	50	261	970	530	134	97	76	57
17.....	57	318	828	465	122	97	86	38
18.....	67	362	735	438	109	97	86	50
19.....	86	465	690	417	97	110	97	66
20.....	76	568	690	477	97	134	86	66
21.....	57	605	735	410	86	97	57	43
22.....	43	690	828	360	76	86	66	50
23.....	38	780	970	340	86	97	76	50
24.....	67	875	1,110	345	76	86	66	50
25.....	67	970	1,155	307	76	76	76	50
26.....	67	1,155	1,110	300	67	86	86	50
27.....	67	1,065	1,250	320	57	97	97	38
28.....	67	875	1,298	280	67	86	76	40
29.....	86	1,018	1,250	242	76	86	76	40
30.....	97	1,435	1,203	240	86	86	76	40
31.....		1,530	292	97	76

Monthly discharge of Laramie River near Jelm, Wyo., for 1912.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
April 12-30.....	134	38	72	2,710
May.....	1,530	76	488	30,000
June.....	1,670	690	1,240	73,800
July.....	1,250	240	543	33,400
August.....	290	57	120	7,380
September.....	134	57	82	4,880
October.....	110	57	83	5,120
November.....	76	38	55	3,290
The period.....				161,000

NOTE.—The above records have been changed slightly from the records of the State engineer to conform with the computing rules of the U. S. Geological Survey.

LARAMIE RIVER AND PIONEER CANAL NEAR WOODS, WYO.

Location.—At the diversion dam for the Pioneer canal, in sec. 36, T. 14 N., R. 77 W., 2 miles above Woods post office. The nearest important tributary is Fox Creek, which enters 3 miles above.

Records available.—April 16 to December 31, 1912. From 1895 to 1900 and from May 7 to November 11, 1911, a station was maintained at Woods Landing, in sec. 11, T. 13 N., R. 77 W. The records are not directly comparable, as Fox Creek enters between and a few small ditches divert water.

Drainage area.—438 square miles (measured from Hayden's Atlas).

Gage.—Vertical staff whose datum is the crest of the dam. This gage shows the water passing over the dam. There is also a chain gage in the Pioneer ditch which shows the water diverted. The sum of these two records is the total flow of Laramie River above the Pioneer diversion.

Channel.—Practically permanent, as the concrete diversion dam is the control. Permanent in the canal.

Discharge measurements.—Made by wading during ordinary and low stages. High-water measurements made at Woods Land, 5 miles above, and the intervening diversions measured.

Winter flow.—No data.

Diversions.—Prior to July 1, 1912, there were adjudicated diversions of 17 second-feet, exclusive of the Pioneer canal, between this station and the one near Jelm, which is almost on the Wyoming-Colorado line.

Accuracy.—Sufficient discharge measurements have been obtained to make the estimates of flow reliable.

Cooperation.—This station is maintained in cooperation with the Laramie Water Co., by whom the greater portion of the field data are furnished. Check measurements have been made by the United States Geological Survey.

Discharge measurements of Laramie River near Woods, Wyo., in 1912.

Date.	Hydrographer.	Gage height.	Dis-charge.	Date.	Hydrographer.	Gage height.	Dis-charge.
Apr. 12	Robert Follansbee.....	<i>Feet.</i> 0.38	<i>Sec.-ft.</i> 86	July 9 ^a	R. I. Meeker.....	<i>Feet.</i> 0.90	315
May 29 ^a	R. I. Meeker.....	2.40	1,210	13	R. H. Fletcher.....	1.20	390
June 1 ^bdo.....	2.90	1,820	20	R. I. Meeker.....	1.20	422
June 5 ^bdo.....	2.95	1,540	26	Robert Follansbee.....	.72	192
12 ^bdo.....	2.65	1,220	Aug. 13	R. I. Meeker.....	.31	53.6
18 ^bdo.....	1.00	295	Sept. 18do.....	.31	54.0
25 ^bdo.....	1.50	484	Dec. 7 ^cdo.....	.18	22.8

^a Measured from Sodergreens Bridge.

^b Measured from Woods Landing Bridge.

^c Free flow over dam, edge of ice 2 feet upstream from crest of dam.

Daily gage height, in feet, of Laramie River near Woods, Wyo., for 1912.

[Angus Matheson, observer.]

Day.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1.....	-----	3.3	2.2	0.95	0.25	0.45	0.4	0.2
2.....	-----	3.25	1.75	.67	.3	.45	.4	.21
3.....	-----	3.3	1.35	.6	.3	.45	.45	.23
4.....	0.25	3.2	1.25	.48	.15	.45	.45	.22
5.....	.5	3.1	1.6	.36	.1	.45	.4	.18
6.....	.5	3.1	1.0	.5	.1	.45	.45	.18
7.....	.5	3.15	.95	.5	.1	.5	.45	.18
8.....	.5	2.9	.85	.55	.1	.55	.45	.19
9.....	.6	2.9	.9	.55	.1	.5	.45	.17
10.....	.8	3.05	.9	.45	.18	.55	.45	.15
11.....	.7	2.7	.9	.4	.15	.5	.42	.18
12.....	.6	2.75	1.05	.38	.1	.5	.4	.18
13.....	.6	2.6	1.2	.3	.1	.5	.4	.19
14.....	.6	2.3	1.1	.25	.1	.45	.5	.2
15.....	.7	2.1	1.2	.25	.3	.45	.48	.24
16.....	.8	1.5	1.15	.3	.35	.48	.38	.3
17.....	.9	1.3	.95	.3	.35	.48	.32	.3
18.....	.9	1.2	.9	.3	.3	.45	.34	.3
19.....	1.5	.9	1.05	.28	.35	.48	.35	.3
20.....	1.5	.75	1.1	.12	.3	.48	.34	.29
21.....	1.5	.75	1.05	.15	.45	.48	.3	.28
22.....	1.5	1.0	.95	.15	.4	.42	.32	.26
23.....	1.5	1.1	.9	.18	.35	.5	.36	.25
24.....	1.6	1.5	.8	.15	.2	.5	.34	.2
25.....	2.3	1.65	.75	.12	.22	.45	.25	.2
26.....	2.3	1.6	.75	.10	.45	.48	.08	.22
27.....	2.1	1.6	.8	.10	.45	.5	.0	.23
28.....	1.5	1.65	.8	.12	.45	.5	.13	.25
29.....	1.8	1.45	.72	.15	.45	.48	.26	.27
30.....	2.5	1.75	.62	.15	.45	.48	.23	.27
31.....	2.9	-----	.78	.25	-----	.45	-----	.28

Daily discharge, in second-feet, of Laramie River near Woods, Wyo., for 1912.

Day.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1.....	0	1,900	1,040	282	42	95	80	30
2.....	0	1,860	732	170	55	95	80	32
3.....	0	1,900	482	145	55	95	95	38
4.....	42	1,820	428	104	20	95	95	35
5.....	110	1,740	635	70	10	95	80	26
6.....	110	1,740	305	110	10	95	95	26
7.....	110	1,780	282	110	10	110	95	26
8.....	110	1,580	240	128	10	128	95	28
9.....	145	1,580	260	128	10	110	95	24
10.....	220	1,700	260	95	26	128	95	20
11.....	180	1,420	260	80	20	110	86	26
12.....	145	1,460	325	75	10	110	80	26
13.....	145	1,340	400	55	10	110	80	28
14.....	145	1,120	350	42	10	95	110	30
15.....	180	970	400	42	55	95	104	40
16.....	220	570	375	55	68	104	75	55
17.....	260	455	282	55	68	104	60	55
18.....	260	400	260	55	55	95	65	55
19.....	570	260	328	50	68	104	68	55
20.....	570	200	350	14	55	104	65	52
21.....	570	200	328	20	95	104	55	50
22.....	570	305	282	20	80	95	60	45
23.....	570	350	260	26	68	110	70	42
24.....	635	570	220	20	30	110	65	30
25.....	1,120	668	200	14	35	95	42	30
26.....	1,120	635	200	10	95	104	8	35
27.....	970	635	220	10	95	110	0	38
28.....	570	668	220	14	95	110	16	42
29.....	765	540	188	20	95	104	45	48
30.....	1,270	732	152	20	95	104	38	48
31.....	1,580	-----	212	42	-----	95	-----	50

NOTE.—Discharge determined from a rating curve well defined below 575 second-feet and fairly well defined above.

Monthly discharge of Laramie River near Woods, Wyo., for 1912.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accu- racy.
	Maximum.	Minimum.	Mean.		
May.....	1,580	0	428	26,300	B.
June.....	1,900	200	1,040	61,900	C.
July.....	1,040	152	338	20,800	B.
August.....	282	10	67.1	4,130	B.
September.....	95	10	48.3	2,870	B.
October.....	128	86	104	6,400	B.
November.....	110	0	69.9	4,160	B.
December.....	55	20	37.6	2,310	B.
The period.....				129,000	

Discharge measurements of Pioneer canal near Woods, Wyo., in 1912.

Date.	Hydrographer.	Gage height.	Dis- charge.	Date.	Hydrographer.	Gage height.	Dis- charge.
		<i>Feet.</i>	<i>Sec.-ft.</i>			<i>Feet.</i>	<i>Sec.-ft.</i>
May 29	R. I. Meeker.....	5.13	709	July 2	R. I. Meeker.....	4.60	502
June 11	do.....	3.08	207	13	R. H. Fletcher.....	3.60	284
18	do.....	5.12	634	20	R. I. Meeker.....	2.20	88
25	do.....	5.88	841	Sept. 18	do.....	1.73	50
25	do.....	6.40	1,020	Aug. 13	do.....	1.80	57
July 2	do.....	2.50	138				

Daily gage height, in feet, and discharge, in second-feet, of Pioneer canal near Woods, Wyo., for 1912.

[Angus Matheson, observer.]

Day.	May.		June.		July.		August.		September.	
	Gage height.	Dis- charge.	Gage height.	Dis- charge.	Gage height.	Dis- charge.	Gage height.	Dis- charge.	Gage height.	Dis- charge.
1.....		50		0	4.65	517	2.15	90	1.6	40
2.....		50		0	4.6	505	2.14	88	1.6	40
3.....		50	4.9	580	4.6	505	2.13	87	1.6	40
4.....		50	4.9	580	4.25	421	2.06	80	1.58	39
5.....		75	5.0	605	3.48	267	2.29	104	1.55	37
6.....		75	5.05	617	1.8	55	1.8	55	1.62	41
7.....		75	5.1	630	4.12	392	1.8	55	1.65	44
8.....		75	5.1	630	4.15	399	1.8	55	1.6	40
9.....		75	4.1	388	4.15	399	1.7	47	1.55	37
10.....		75		149	4.15	399	1.7	47	1.58	39
11.....		75	3.1	209	4.2	410	1.7	47	1.65	44
12.....		100	3.5	270	3.7	306	1.75	51	1.75	51
13.....		100	3.3	239	3.2	224	1.8	55	1.75	51
14.....		100	3.2	224	3.6	288	1.9	64	1.75	51
15.....		100	5.0	605	3.32	242	2.1	84	1.55	37
16.....		100	5.0	605	2.35	112	1.9	64	1.55	37
17.....		100	5.2	655	2.2	95	1.9	64	1.62	41
18.....		120	5.1	630	2.2	95	1.9	64	1.75	51
19.....		120	5.1	630	2.2	95	1.9	64	1.75	51
20.....		120	5.1	630	2.25	101	1.7	47	1.75	51
21.....		120	5.1	630	2.3	106	1.6	40	1.3	23
22.....		200	5.1	630	2.3	106	1.88	63	1.3	23
23.....		300	5.4	710	2.12	86	1.78	54	1.3	23
24.....		400	5.5	740	2.15	90	1.75	51	1.1	16
25.....		500	5.7	800	2.15	90	1.75	51	.65	7
26.....		600	5.7	800	2.15	90	1.75	51		
27.....		700	5.7	800	2.15	90	1.75	51		
28.....		700	5.75	815	2.15	90	1.75	51		
29.....		550	5.7	800	2.15	90	1.75	51		
30.....		650	5.05	617	2.15	90	1.75	51		
31.....		475			2.15	90	1.75	51		

NOTE.—Discharge determined from a very well defined rating curve.

Monthly discharge of Pioneer canal near Woods, Wyo., for 1912.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accu- racy.
	Maximum.	Minimum.	Mean.		
May.....	700	50	222	13,600	A.
June.....	815	149	540	32,100	A.
July.....	517	55	221	13,600	A.
August.....	104	47	60.5	3,720	A.
September 1-25.....	51	7	38.2	1,890	A.
The period.....				64,900	

Combined monthly discharge of Laramie River and Pioneer canal near Woods, Wyo., for 1912.

Month.	Mean discharge in second-feet.	Run-off (total in acre-feet.)	Month.	Mean discharge in second-feet.	Run-off total in acre-feet).
May.....	650	39,900	October.....	104	6,400
June.....	1,580	94,000	November.....	69.9	4,160
July.....	559	34,400	December.....	37.6	2,310
August.....	128	7,850			
September.....	86.5	4,760	The period.....		194,000

LARAMIE RIVER AT TWO RIVERS, WYO.

Location.—At highway bridge at Two Rivers post office, in sec. 5, T. 17 N., R. 74 W.

The nearest tributary is Little Laramie River, which enters one-fourth mile below the station.

Records available.—May 6, 1911, to October 31, 1912.

Drainage area.—1,210 square miles (measured from King's Atlas).

Gage.—Vertical staff.

Channel.—Slightly shifting.

Discharge measurements.—Made from the bridge.

Winter flow.—Ice causes backwater during the winter months and the records are discontinued.

Diversions.—Prior to July 1, 1912, there were adjudicated diversions from Laramie River of approximately 350 second-feet between this station and the one near Woods.

Accuracy.—Although the channel is somewhat shifting, sufficient measurements have been made to produce reliable results.

Discharge measurements of Laramie River at Two Rivers, Wyo., in 1912.

Date.	Hydrographer.	Gage height.	Dis-charge.	Date.	Hydrographer.	Gage height.	Dis-charge.
Jan. 31 ^a	R. H. Fletcher.....	Feet. 3.10	Sec.-ft. 40.0	Aug. 19	R. H. Fletcher.....	Feet. 2.03	Sec.-ft. 61.8
May 30do.....	3.50	45.0	Oct. 15do.....	2.28	10.5
July 9do.....	2.85	20.1	Dec. 22 ^a	R. I. Meeker.....	3.3
23	Robert Follansbee.....	2.92	24.1				

^a Relation of gage height to discharge affected by ice.

Daily gage height, in feet, of Laramie River at Two Rivers, Wyo., for 1912.

[Harold Peters, observer.]

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
1....		1.85	4.25	3.9	3.65	1.6	1.6	16....	1.95	2.55	5.4	2.75	2.1	1.7	2.3
2....		1.85	4.7	3.9	3.4	1.6	1.7	17....	1.85	2.55	5.1	3.0	2.0	1.7	2.3
3....		1.85	5.05	3.9	3.4	1.6	1.7	18....	1.85	2.55	4.65	2.95	2.0	1.7	2.3
4....		1.85	5.1	3.65	2.8	1.6	1.7	19....	1.85	2.55	4.1	2.8	2.04	1.7	2.3
5....	3.45	1.85	5.15	3.65	2.65	1.6	1.7	20....	1.85	2.75	3.35	2.8	2.03	1.7	2.3
6....	3.45	1.85	5.2	3.6	2.4	1.6	1.8	21....	1.85	2.7	2.85	2.9	2.01	1.7	2.2
7....	3.2	1.85	5.3	3.6	2.4	1.6	1.8	22....	1.85	2.65	2.8	2.8	2.0	1.8	2.2
8....	2.85	1.85	5.6	3.4	2.4	1.7	1.7	23....	1.85	2.65	2.85	2.7	1.9	1.9	2.2
9....	2.35	1.75	5.6	2.9	2.4	1.8	1.8	24....	1.85	2.95	2.9	2.6	1.8	2.0	2.2
10....	2.3	2.55	5.6	2.9	2.3	1.8	1.8	25....	1.85	2.95	2.8	2.6	1.7	2.1	2.3
11....	2.25	2.55	5.6	2.75	2.3	1.8	1.9	26....	1.85	3.35	2.8	2.6	1.7	2.1	2.4
12....	2.25	2.45	5.8	2.6	2.2	1.8	1.9	27....	1.85	3.35	3.0	2.6	1.7	2.1	2.4
13....	2.15	2.55	5.7	2.5	2.2	1.7	2.0	28....	1.85	3.35	3.65	2.6	1.6	2.1	2.4
14....	1.95	2.45	5.55	2.6	2.2	1.7	2.2	29....	1.85	3.35	3.9	2.6	1.65	2.1	2.3
15....	1.9	2.45	5.4	2.7	2.2	1.7	2.3	30....	1.85	3.55	3.9	2.9	1.6	2.1	2.1
								31....		3.9		3.35	1.6		2.2

Daily discharge, in second-feet, of Laramie River at Two Rivers, Wyo., for 1912.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
1....		34	735	555	495	10	10	16....	48	154	1,200	190	71	17	106
2....		34	915	555	405	10	17	17....	34	154	1,080	260	55	17	106
3....		34	1,060	555	405	10	17	18....	34	154	895	245	55	17	106
4....		34	1,080	460	214	10	17	19....	34	154	660	200	61	17	106
5....	422	34	1,100	460	178	10	17	20....	34	202	370	200	60	17	106
6....	422	34	1,120	440	125	10	27	21....	34	189	215	241	57	17	88
7....	335	34	1,160	440	125	10	27	22....	34	178	200	214	55	27	88
8....	228	34	1,280	370	125	17	17	23....	34	178	215	189	40	40	88
9....	116	22	1,280	215	125	27	27	24....	34	256	230	166	27	55	88
10....	106	154	1,280	215	106	27	27	25....	34	256	200	166	17	71	106
11....	97	154	1,280	175	106	27	40	26....	34	388	200	166	17	71	125
12....	97	135	1,360	145	88	27	40	27....	34	388	260	166	17	71	125
13....	80	154	1,320	135	88	17	55	28....	34	388	480	166	10	71	125
14....	48	135	1,260	155	88	17	88	29....	34	388	580	166	14	71	106
15....	40	135	1,200	180	88	17	106	30....	34	388	580	241	10	71	71
								31....		595		388	10		88

NOTE.—Discharge determined by indirect method for shifting channels. Discharge interpolated for days for which gage heights are missing.

Monthly discharge of Laramie River at Two Rivers, Wyo., for 1912.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accu- racy.
	Maximum.	Minimum.	Mean.		
1911.					
April 5-30.....	422	34	96.7	4,980	C.
May.....	595	34	180	11,100	C.
June.....	1,360	200	826	49,200	D.
July.....	555	135	272	16,700	C.
August.....	495	10	108	6,640	B.
September.....	71	10	29.9	1,780	B.
October.....	125	10	69.7	4,290	B.
The period.....				94,700	

LARAMIE RIVER NEAR WHEATLAND, WYO.

Location.—At the Wheeler ranch, in sec. 35, T. 25 N., R. 69 W., 10 miles northwest of Wheatland. The nearest tributary is Sibylee Creek, which enters half a mile below.

Records available.—April 13 to November 9, 1912.

Drainage area.—Not measured.

Gage.—Vertical staff.

Channel.—Fairly permanent, as the control point is rapids a short distance below.

Discharge measurements.—Made by wading, except during high water, when measurements are made from the bridge, 100 yards downstream.

Winter flow.—Ice causes backwater during the winter months.

Diversions.—The greater part of the flow of Laramie River is diverted above the station for irrigation. Prior to July 1, 1912, there were adjudicated diversions of 1,273 second-feet from Laramie River, nearly all above the station.

Accuracy.—Conditions are favorable for fairly accurate results and the estimates should be reliable, except that the discharge above 70 second-feet may be somewhat in error, owing to a lack of high-water measurements.

Cooperation.—This station is maintained in cooperation with the Goldsborough Co.

Discharge measurements of Laramie River near Wheatland, Wyo., in 1912.

Date.	Hydrographer	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		<i>Feet.</i>	<i>Sec.-ft.</i>			<i>Feet.</i>	<i>Sec.-ft.</i>
May 23	R. H. Fletcher.....	0.85	38.8	Aug. 13	R. H. Fletcher.....	.43	3.2
June 23do.....	.47	3.1	Sept. 1do.....	.46	4.25
July 26do.....	.43	2.9	Oct. 24do.....	.68	13.1

Daily gage height, in feet, of Laramie River near Wheatland, Wyo., for 1912.

[R. F. Gunson, observer.]

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1.....		0.85	1.0	0.83	0.48	0.46	0.55	0.75	0.45
2.....		.9	.75	.78	.78	.41	.55	.70	.45
3.....		.95	.7	.68	.68	.36	.55	.80	.5
4.....		.85	.65	.88	.68	.41	.55	.75	.8
5.....		.8	.6	.78	.63	.41	.55	.70	.65
6.....		.85	.5	.78	.58	.36	.6	.70	.65
7.....		.85	.5	.68	.58	.36	.55	.60	.65
8.....		.9	.5	.68	.58	.36	.55	.70	.65
9.....		.9	.6	.68	.53	.46	.55	.70	.65
10.....		1.0	.6	.63	.48	.66	.8	.7	.65
11.....		.95	.6	.58	.48	.56	.75	.7	.65
12.....		.9	.75	.58	.48	.46	.75	.8	.7
13.....	0.9	.9	.85	.58	.48	.51	.75	.7	.65
14.....	.7	.9	.85	.68	.38	.56	.75	.7	.6
15.....	.55	.9	.6	.68	.48	.56	.7	.7	.6
16.....	.5	.9	.65	.58	.66	.56	.65	.7	.6
17.....	.5	.9	.65	.53	.56	.56	.65	.65
18.....	.55	.9	.6	.53	.56	.56	.65	.65
19.....	.6	.9	.6	.58	.56	.56	.65	.65
20.....	.7	.9	.6	.58	.51	.56	.65	.65
21.....	.7	.9	.5	.58	.46	.56	.65	.65
22.....	.7	.9	.45	.58	.51	.51	.65	.7
23.....	.7	.85	.4	.53	.56	.51	.65	.7
24.....	.75	.8	.4	.48	.56	.56	.65	.7
25.....	.75	.8	.65	.48	.56	.56	.70	.7
26.....	.75	.85	.6	.43	.46	.56	.65	.7
27.....	.75	.8	.55	.48	.46	.56	.65	.6
28.....	.8	.8	.55	.48	.46	.56	.65	.6
29.....	.8	.75	.6	.43	.46	.56	.75	.7
30.....	.85	.7	.6	.48	.46	.56	.80	.65
31.....		1.248	.4680

Daily discharge, in second-feet, of Laramie River near Wheatland, Wyo., for 1912.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1.....		39	70	35	5	4	7	22	4
2.....		48	22	27	27	3	7	15	4
3.....		59	15	14	14	2	7	30	5
4.....		39	12	44	14	3	7	22	30
5.....		30	9	27	11	3	7	15	12
6.....		39	5	27	8	2	9	15	12
7.....		39	5	14	8	2	7	9	12
8.....		48	5	14	8	2	7	15	12
9.....		48	9	14	6	4	7	15	12
10.....		70	9	11	5	13	30	15	12
11.....		59	9	8	5	7	22	15	12
12.....		48	22	8	5	4	22	30	15
13.....	48	48	39	8	5	5	22	15	12
14.....	15	48	39	14	3	7	22	15	9
15.....	7	48	9	14	5	7	15	15	9
16.....	5	48	12	8	13	7	12	15	9
17.....	5	48	12	6	7	7	12	12	9.0
18.....	7	48	9	6	7	7	12	12	9.0
19.....	9	48	9	8	7	7	12	12	9.0
20.....	15	48	9	8	5	7	12	12	9.0
21.....	15	48	5	8	4	7	12	12	9.0
22.....	15	48	4	8	5	5	12	15	9.0
23.....	15	39	3	6	7	5	12	15	9.0
24.....	22	30	3	5	7	7	12	15	9.0
25.....	22	30	12	5	7	7	15	15	9.0
26.....	22	39	9	4	4	7	12	15	9.0
27.....	22	30	7	5	4	7	12	9	9.0
28.....	30	30	7	5	4	7	12	9	9.0
29.....	30	22	9	4	4	7	22	15	9.0
30.....	39	15	9	5	4	7	30	12	9.0
31.....		117		5	4		30		

NOTE.—Discharge determined from a rating curve well defined below 70 second-feet. Discharge Dec. 17-31 estimated at 9 second-feet.

Monthly discharge of Laramie River near Wheatland, Wyo., for 1912.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accu- racy.
	Maximum.	Minimum.	Mean.		
April 13-30.....	48	5	19.1	684	B.
May.....	117	15	45.1	2,770	B.
June.....	70	3	13.3	791	B.
July.....	44	4	12.1	744	B.
August.....	27	3	7.16	440	B.
September.....	13	2	5.63	335	B.
October.....	30	7	14.2	873	B.
November.....	30	9	15.3	910	B.
December.....	30	4	10.2	627	C.
The period.....				7,170	

LITTLE LARAMIE RIVER NEAR FILMORE, WYO.

Location.—At May's ranch, in sec. 9, T. 15 N., R. 77 W., $1\frac{1}{2}$ miles south of Filmore post office, 4 miles below the junction of the North, Middle, and South forks, 8 miles above the mouth of Mill Creek, the nearest tributary below.

Records available.—May 14, 1911, to October 31, 1912.

Drainage area.—Not measured.

Gage.—Vertical staff.

Channel.—Somewhat shifting.

Discharge measurements.—Made from bridge during high water and by wading at ordinary stages.

Winter flow.—No data.

Diversions.—Prior to July 1, 1912, there were adjudicated diversions of 450 second-feet from the Little Laramie, both above and below the station.

Accuracy.—Owing to the shifting character of the channel, the estimates of flow have been obtained by the indirect method and can be considered only fair.

Discharge measurements of Little Laramie River near Filmore, Wyo., in 1912.

Date.	Hydrographer.	Gage height.	Discharge.
May 30	R. H. Fletcher.....	<i>Feet.</i> 3.00	<i>Sec.-ft.</i> 558
Aug. 26do.....	1.10	51
Oct. 15do.....	1.35	62

Daily gage height, in feet, of Little Laramie River near Filmore, Wyo., for 1912.

[Ralph May, observer.]

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
1....	1.55	3.15	3.55	2.6	1.3	1.3	16....	2.05	3.35	2.45	1.5	1.65	1.35
2....	1.55	3.35	3.3	2.3	1.2	1.3	17....	1.9	3.15	2.5	1.5	1.75	1.4
3....	1.45	4.0	2.95	2.05	1.15	1.3	18....	2.05	2.85	2.45	1.45	1.6	1.3
4....	1.3	4.35	2.95	2.0	1.1	1.3	19....	2.0	2.75	2.5	1.4	1.45	1.35
5....	1.3	4.5	2.85	1.9	1.1	1.3	20....	2.1	2.75	2.55	1.35	1.4	1.45
6....	1.3	4.65	2.7	1.8	1.1	1.4	21....	1.15	2.2	2.85	2.55	1.3	1.4	1.35
7....	1.4	4.6	2.7	1.8	1.05	1.4	22....	1.15	2.15	3.3	2.45	1.2	1.4	1.1
8....	1.55	4.7	2.7	1.75	1.1	1.4	23....	1.2	2.2	3.6	2.25	1.2	1.35	1.25
9....	1.7	4.8	2.6	1.65	1.1	1.35	24....	1.2	2.35	3.8	2.15	1.2	1.3	1.3
10....	1.8	4.45	2.8	1.6	1.45	1.4	25....	1.4	2.4	4.0	2.1	1.2	1.3	1.35
11....	1.7	4.4	2.75	1.55	1.45	1.5	26....	1.25	2.55	3.7	2.05	1.2	1.3	1.4
12....	1.65	4.45	2.55	1.5	1.4	1.55	27....	1.2	2.8	3.75	2.0	1.2	1.25	1.4
13....	1.5	4.4	2.55	1.5	1.25	1.55	28....	1.25	2.65	3.7	2.0	1.25	1.25	1.4
14....	1.6	4.0	2.5	1.5	1.4	1.5	29....	1.5	2.65	3.55	2.05	1.2	1.25	1.4
15....	1.95	3.6	2.45	1.5	1.45	1.5	30....	1.55	3.0	2.45	1.35	1.25	1.3
								31....	3.25	2.8	1.35	1.3

Daily discharge, in second-feet, of Little Laramie River near Filmore, Wyo., for 1912.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
1912.								1912							
1....	107	595	772	375	78	66	16....	212	682	330	110	126	74
2....	107	682	660	290	64	66	17....	175	595	345	110	145	81
3....	90	990	515	228	58	66	18....	212	475	330	102	116	66
4....	66	1,170	515	215	52	66	19....	200	435	345	93	90	74
5....	66	1,260	475	190	52	66	20....	225	435	360	86	81	90
6....	66	1,350	415	170	52	81	21....	46	255	475	360	78	81	74
7....	81	1,320	415	170	46	81	22....	46	238	660	330	64	81	41
8....	107	1,380	415	160	52	81	23....	53	255	795	278	64	74	60
9....	135	1,440	375	140	52	74	24....	53	300	890	252	64	66	66
10....	155	1,230	455	130	102	81	25....	81	315	990	240	64	66	74
11....	135	1,200	435	120	90	98	26....	60	360	840	228	64	66	81
12....	126	1,230	360	110	81	107	27....	53	455	865	215	64	60	81
13....	98	1,200	360	110	60	107	28....	60	395	840	215	71	60	81
14....	116	990	345	110	81	98	29....	98	395	772	228	64	60	81
15....	188	795	330	110	90	98	30....	107	535	772	330	86	60	66
								31....	638	455	86	66

NOTE.—Discharge determined from a series of fairly well-defined parallel curves.

Monthly discharge of Little Laramie River near Filmore, Wyo., for 1912.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accu- racy.
	Maximum.	Minimum.	Mean.		
April 21-30.....	107	46	65.7	1,300	C.
May.....	638	66	220	13,500	C.
June.....	1,440	435	912	54,300	C.
July.....	772	215	377	23,200	C.
August.....	375	64	126	7,750	C.
September.....	145	46	74.7	4,440	C.
October.....	107	41	77.2	4,750	C.
The period.....				109,000	

LITTLE LARAMIE RIVER AT TWO RIVERS, WYO.

Location.—At highway bridge on section line between secs. 5 and 6, T. 17 N., R. 74 W., one-half mile south of Two Rivers post office; nearest tributary, Mill Creek, enters about 12 miles above; no tributary between the station and the mouth, one-half mile below.

Records available.—May 1, 1911, to October 31, 1912.

Drainage area.—421 square miles (measured from King's atlas).

Gage.—Vertical staff.

Channel.—Shifting during 1911 but apparently permanent during 1912.

Discharge measurements.—Made from bridge during high water and by wading at ordinary stages.

Winter flow.—Ice causes backwater during the winter months and the records are discontinued.

Diversions.—Prior to July 1, 1912, there were adjudicated diversions from Little Laramie River of 451 second-feet and from the tributaries 326 second-feet. These diversions are all above the station.

Accuracy.—Conditions are favorable for accurate results and the estimates are considered reliable.

Discharge measurements of Little Laramie River at Two Rivers, Wyo., in 1912.

Date.	Hydrographer.	Gage height.	Dis- charge.	Date.	Hydrographer.	Gage height.	Dis- charge.
		<i>Feet.</i>	<i>Sec.-ft.</i>			<i>Feet.</i>	<i>Sec.-ft.</i>
Jan. 31	R. H. Fletcher.....		^a 8.0	July 9	R. H. Fletcher.....	2.60	57.0
May 30do.....	2.40	32.7	Aug. 19do.....	2.50	43.1
June 3	R. I. Meeker.....	2.80	88	Oct. 15do.....	2.67	70.8
20do.....	3.15	180	Dec. 22	R. I. Meeker.....	(b)	13.3

^a Discharge estimated; impossible to measure, as water is not running in a channel but seeping through the different layers of ice.

^b Relation of gage height to discharge affected by ice.

Daily gage height, in feet, of Little Laramie River at Two Rivers, Wyo., for 1912.

[Harold Peters, observer.]

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
1....	2.3	3.1	3.5	2.8	2.1	2.6	17....	2.4	2.4	3.2	2.6	2.4	2.8	2.6
2....	2.3	3.2	3.5	3.0	2.1	2.6	18....	2.4	2.3	2.85	2.6	2.4	2.8	2.6
3....	2.3	3.1	3.6	2.9	2.1	2.7	19....	2.4	2.3	2.5	2.6	2.5	2.8	2.6
4....	2.3	3.75	3.6	2.5	2.1	2.7	20....	2.4	2.3	3.4	2.7	2.45	2.8	2.5
5....	4.0	2.3	4.15	3.6	2.55	2.1	2.7	21....	2.4	2.2	3.3	2.8	2.4	2.8	2.5
6....	3.9	2.3	4.25	3.5	2.5	2.1	2.8	22....	2.4	2.2	3.4	2.85	2.4	2.8	2.4
7....	4.0	2.3	4.4	3.45	2.5	2.1	2.8	23....	2.4	2.25	3.4	2.7	2.4	2.7	2.4
8....	3.7	2.4	4.4	3.45	2.5	2.1	2.8	24....	2.4	2.3	3.4	2.7	2.3	2.6	2.4
9....	3.1	2.4	4.4	3.3	2.5	2.3	2.8	25....	2.4	2.3	3.4	2.55	2.3	2.6	2.4
10....	2.7	2.6	4.4	3.2	2.4	2.3	2.7	26....	2.3	2.3	3.4	2.35	2.3	2.6	2.4
11....	2.65	2.6	4.55	3.2	2.4	2.2	2.7	27....	2.3	2.3	3.5	2.35	2.3	2.5	2.4
12....	2.6	2.6	4.15	3.0	2.35	2.2	2.7	28....	2.2	2.3	3.5	2.25	2.3	2.5	2.4
13....	2.6	2.6	3.75	2.9	2.25	2.1	2.6	29....	2.2	2.3	3.5	2.2	2.3	2.5	2.4
14....	2.6	2.6	3.35	2.8	2.3	2.4	2.6	30....	2.3	2.35	3.5	2.65	2.2	2.5	2.3
15....	2.3	2.5	3.2	2.7	2.5	2.4	2.6	31....	2.55	2.75	2.1	2.3
16....	2.3	2.4	3.2	2.6	2.4	2.7	2.6								

Daily discharge, in second-feet, of Little Laramie River at Two Rivers, Wyo., for 1911-12.

Day.	May.	June.	July.	Oct.	Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
1911.					1912.							
1.....	6	32	27	0	1....	24	160	275	94	10	60
2.....	6	78	38	0	2....	24	185	275	135	10	60
3.....	6	106	38	0	3....	24	160	305	114	10	76
4.....	6	106	38	0	4....	24	355	305	46	10	76
5.....	6	173	27	0	5....	435	24	485	305	53	10	76
6.....	6	210	18	0	6....	405	24	518	275	46	10	94
7.....	6	216	18	0	7....	435	24	555	260	46	10	94
8.....	6	200	12	0	8....	340	34	565	260	46	10	94
9.....	6	317	12	0	9....	160	34	565	215	46	24	94
10....	6	341	12	0	10....	76	60	565	185	34	24	76
11....	6	255	12	0	11....	68	60	618	185	34	16	76
12....	6	162	6	0	12....	60	60	485	135	29	16	76
13....	0	123	3	0	13....	60	60	355	114	20	10	60
14....	0	101	3	0	14....	60	60	230	94	24	34	60
15....	0	82	3	0	15....	24	46	185	76	46	34	60
16....	0	101	3	0	16....	24	34	185	60	34	76	60
17....	1.5	345	2	0	17....	34	34	185	60	34	94	60
18....	1.5	495	1.5	1	18....	34	24	104	60	34	94	60
19....	1.5	236	3	3.0	19....	34	24	46	60	46	94	60
20....	6	117	2	4.0	20....	34	24	245	76	40	94	46
21....	1	106	1	3.0	21....	34	16	215	94	34	94	46
22....	0	252	1	3.0	22....	34	16	245	104	34	94	34
23....	0	304	1.5	4.0	23....	34	24	245	76	34	76	34
24....	0	174	1.5	6.0	24....	34	24	245	76	24	60	34
25....	0	117	1	8.0	25....	34	24	245	53	24	60	34
26....	0	106	1	14	26....	24	24	245	29	24	60	34
27....	0	78	0	18	27....	24	24	275	29	24	46	34
28....	0	69	0	18	28....	16	24	275	20	24	46	34
29....	0	38	0	12	29....	16	24	275	16	24	46	34
30....	6	27	0	14	30....	24	29	275	68	16	46	24
31....	6	0	18	31....	53	84	10	24

NOTE.—Discharge for 1911 determined from a fairly well-defined rating curve. Stream dry during August and September, 1911. Discharge for 1912 determined from a rating curve well defined below 300 second-feet.

Monthly discharge of Little Laramie River at Two Rivers, Wyo., for 1911-12.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accu- racy.
	Maximum.	Minimum.	Mean.		
1911.					
May.....	6.0	0	3.08	189	C.
June.....	495	27	169	10,100	C.
July.....	38	0	9.21	566	C.
August.....	0	0	0	0	
September.....	0	0	0	0	
October.....	18	0	4.07	250	C.
November 1-4.....	27	22	25.8	205	C.
The period.....				11,300	
1912.					
April 5-30.....	435	16	98.3	5,070	A.
May.....	60	16	32.3	1,990	A.
June.....	618	46	310	18,500	C.
July.....	305	16	136	8,360	B.
August.....	135	10	41.1	2,530	A.
September.....	94	10	43.9	2,610	A.
October.....	94	24	57.5	3,540	A.
The period.....				42,600	

SIBYLEE CREEK NEAR WHEATLAND, WYO.

Location.—In sec. 35, T. 25 N., R. 69 W., 10 miles west of Wheatland and half a mile above the mouth of the creek. No tributary within several miles.

Records available.—May 23 to November 4, 1912.

Drainage area.—Not measured.

Gage.—Vertical staff 150 feet above the highway bridge.

Channel.—Shifting. There is considerable fall between the station and the mouth, so there is no backwater effect from Laramie River.

Discharge measurements.—Made from the bridge during high water and by wading at ordinary stages.

Winter flow.—No data.

Diversions.—Most of the water is diverted above the station for irrigation. Prior to July 1, 1912, there were adjudicated diversions of 56 second-feet from Sibylee Creek and 62 from tributaries, all above the station. During the latter part of the irrigation season in 1912 the water was turned back into the river, as the ditches were out of repair.

Accuracy.—Owing to the shifting channel no estimates of flow have been made.

Cooperation.—Station maintained in cooperation with the Goldsborough Co.

Discharge measurements of Sibylee Creek near Wheatland, Wyo., in 1912.

Date.	Hydrographer.	Gage height.	Dis- charge.	Date.	Hydrographer.	Gage height.	Dis- charge.
		<i>Feet.</i>	<i>Sec.-ft.</i>			<i>Feet.</i>	<i>Sec.-ft.</i>
May 23	R. H. Fletcher.....	1.00	10.0	Aug. 13	R. H. Fletcher.....	1.13	39.4
June 23	do.....	.98	22.1	Sept. 1	do.....	1.20	60.5
July 12	R. I. Maeker.....	.90	26.6	Oct. 24	do.....	1.00	33.1
26	R. H. Fletcher.....	.50	2.6				

Daily gage height, in feet, of Sibylee Creek near Wheatland, Wyo., for 1912.

[R. F. Gunson, observer.]

Day.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1		1.85	1.0	0.8	1.0	0.7	0.9	1.15
2		1.75	1.15	3.1	1.0	.7	.9	1.2
3		1.2	1.0	2.3	.9	.7	.9	1.25
4		1.1	.95	1.95	.9	.7	.9	1.1
5		1.0	.95	1.6	.9	.7	.9	1.3
6		1.1	.9	1.5	.85	.85	.9	1.25
7		1.4	.9	1.45	.8	.8	1.1	1.25
8		1.4	.9	1.35	.8	.8	1.1	1.4
9		1.4	.8	1.25	.9	.8	1.1	1.45
10		2.0	.8	1.1	1.85	1.05	1.1	1.3
11		1.45	.85	1.0	1.4	.9	1.1	1.3
12		2.48	.9	1.6	1.1	.8	1.25	1.35
13		2.7	.9	1.0	1.1	.8	1.2	1.3
14		2.3	1.0	1.1	1.2	.8	1.2	1.2
15		1.8	.8	1.45	1.2	.8	1.2	1.2
16		1.25	.7	2.1	1.3	.8	1.2	1.2
17		1.7	.65	1.5	1.1	.8	1.2
18		1.3	.6	1.55	1.1	.9	1.2
19		1.1	.8	1.2	1.05	.85	1.2
20		1.0	.8	1.7	1.0	.9	1.2
21		1.0	.8	1.3	1.0	.9	1.1
22		.9	.85	1.4	.95	.9	1.1
23	1.0	.95	.75	1.35	.9	.9	1.1
24	1.1	1.1	.7	1.4	.8	.9	1.1
25	1.85	.9	.65	1.4	.8	1.0	1.1
26	1.75	.8	.6	1.1	.8	1.0	1.1
27	1.9	.8	.7	1.2	.8	1.0	1.2
28	1.9	.8	.8	1.1	.8	1.05	1.1
29	1.8	.7	.8	1.1	.8	.9	1.1
30	1.55	.9	.75	1.1	.8	.9	1.15
31	1.858	1.49

NORTH LARAMIE RIVER NEAR WHEATLAND, WYO.

Location.—At Wilson's ranch, in sec. 6, T. 25 N., R. 69 W., Sixth principal meridian, 15 miles above the mouth and about 19 miles northwest of Wheatland. The station is 1 mile below the headgate of the North Laramie Land Co.'s ditch.

Records available.—February 15 to December 31, 1912.

Drainage area.—Not measured.

Gage.—Vertical staff.

Channel.—Apparently permanent.

Discharge measurements.—Made by wading.

Winter flow.—Ice causes backwater during the winter months and discharge measurements are made to determine the approximate flow.

Diversions.—Water is diverted at a number of points above and below the station.

Accuracy.—Owing to a lack of high-water measurements the estimates for discharge above 50 second-feet can only be considered fair; below that point they should be reliable.

Cooperation.—Station maintained in cooperation with Mr. J. A. Whiting, of the North Laramie Land Co.

Discharge measurements of North Laramie River near Wheatland, Wyo., in 1912.

Date.	Hydrographer.	Gage height.	Dis-charge.	Date.	Hydrographer.	Gage height.	Dis-charge.
		<i>Feet.</i>	<i>Sec.-ft.</i>			<i>Feet.</i>	<i>Sec.-ft.</i>
Feb. 15 ^a	R. H. Fletcher	1.20	5.3	July 27	R. H. Fletcher	1.40	12.7
Mar. 15 ^ado.....	1.30	5.5	Aug. 13do.....	1.22	6.8
May 21do.....	3.60	58.4	Oct. 24do.....	1.35	5.4
June 24do.....	1.60	28.9				

^a Relation of gage height to discharge affected by ice. Stream open at measuring section, but partly frozen over at gage above and at control below.

Daily gage height, in feet, of North Laramie River near Wheatland, Wyo., for 1912.

[Charles Wilson, observer.]

Day.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1.....		1.2	1.3	2.9	2.2	1.4	1.5	1.2	1.2	1.4	1.2
2.....		1.2	1.32	3.5	2.15	1.4	2.2	1.2	1.2	1.4	1.3
3.....		1.2	1.41	3.4	2.14	1.4	1.6	1.2	1.2	1.4	1.4
4.....		1.2	1.4	2.9	2.0	1.4	1.4	1.2	1.2	1.4	1.3
5.....		1.2	1.41	2.8	1.95	1.4	1.3	1.2	1.2	1.4	1.3
6.....		1.2	1.45	2.3	1.9	1.4	1.25	1.2	1.2	1.4	1.3
7.....		1.2	1.4	2.3	1.8	1.4	1.25	1.2	1.2	1.4	1.3
8.....		1.2	1.55	2.75	1.8	1.4	1.2	1.2	1.15	1.4	1.3
9.....		1.25	1.9	3.2	1.8	1.4	1.2	1.2	1.15	1.4	1.3
10.....		1.25	3.1	3.6	1.8	1.3	1.2	1.2	1.15	1.4
11.....		1.25	2.8	3.6	1.85	1.3	1.2	1.2	1.15	1.4
12.....		1.3	3.0	2.95	1.9	1.25	1.2	1.2	1.15	1.3
13.....		1.2	2.8	2.9	1.95	1.35	1.2	1.2	1.15	1.2
14.....		1.3	2.4	2.7	2.0	1.4	1.2	1.2	1.15	1.2
15.....		1.3	1.7	2.8	2.0	1.4	1.3	1.2	1.15	1.2
16.....		1.3	1.7	2.7	1.9	1.4	1.2	1.2	1.2	1.2
17.....	1.2	1.3	1.7	3.0	1.9	1.4	1.5	1.2	1.2	1.2
18.....	1.25	1.3	1.7	3.4	1.8	1.4	1.5	1.2	1.2	1.2
19.....	1.3	1.35	1.82	3.3	1.75	1.4	1.2	1.2	1.2	1.2
20.....	1.3	1.92	3.6	1.7	1.4	1.2	1.2	1.2	1.2
21.....	1.3	1.35	1.98	3.6	1.7	1.4	1.2	1.2	1.2	1.2
22.....	1.2	1.35	1.9	3.5	1.6	1.4	1.2	1.2	1.2	1.2
23.....	1.3	1.4	2.1	3.4	1.6	1.4	1.2	1.2	1.2	1.2
24.....	1.3	1.3	2.0	2.9	1.6	1.4	1.2	1.2	1.2	1.1
25.....	1.3	2.15	2.9	1.5	1.4	1.25	1.2	1.2	1.15
26.....	1.15	1.35	2.18	2.8	1.5	1.35	1.2	1.2	1.2	1.2
27.....	1.15	1.3	2.2	2.5	1.5	1.55	1.25	1.25	1.2	1.1
28.....	1.2	1.28	2.3	2.4	1.5	1.6	1.2	1.22	1.2	1.1
29.....	1.2	1.35	2.5	2.3	1.4	1.5	1.2	1.2	1.4	1.2
30.....	1.35	2.6	2.2	1.4	1.45	1.2	1.2	1.4	1.1
31.....	1.3	2.2	1.4	1.2	1.4

NOTE.—Relation of gage height to discharge affected by ice Feb. 17 to Mar. 19.

Daily discharge, in second-feet, of North Laramie River near Wheatland, Wyo., for 1912.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1.....		7	276	108	12	20	4.0	4.0	12	4.0
2.....		8	530	100	12	108	4.0	4.0	12	7.0
3.....		13	480	98	12	29	4.0	4.0	12	12.0
4.....		12	276	76	12	12	4.0	4.0	12	7.0
5.....		13	246	69	12	7.0	4.0	4.0	12	7.0
6.....		16	126	62	12	5.5	4.0	4.0	12	7.0
7.....		12	126	50	12	5.5	4.0	4.0	12	7.0
8.....		24	231	50	12	4.0	4.0	2.5	12	7.0
9.....		62	385	50	12	4.0	4.0	2.5	12	7.0
10.....		345	580	50	7	4.0	4.0	2.5	12
11.....		246	580	56	7.0	4.0	4.0	2.5	12
12.....		310	293	62	5.5	4.0	4.0	2.5	7.0
13.....		246	276	69	9.5	4.0	4.0	2.5	4.0
14.....		146	216	76	12	4.0	4.0	2.5	4.0
15.....	5.5	39	246	76	12	7.0	4.0	2.5	4.0
16.....	5.5	39	216	62	12	4.0	4.0	4.0	4.0
17.....	5.5	39	310	62	12	20	4.0	4.0	4.0
18.....	5.5	39	480	50	12	20	4.0	4.0	4.0
19.....	9.5	52	330	44	12	4.0	4.0	4.0	4.0
20.....	9.5	65	580	39	12	4.0	4.0	4.0	4.0
21.....	9.5	73	580	39	12	4.0	4.0	4.0	4.0
22.....	9.5	62	530	29	12	4.0	4.0	4.0	4.0
23.....	12.0	91	480	29	12	4.0	4.0	4.0	4.0
24.....	7.0	76	276	29	12	4.0	4.0	4.0	1.0
25.....	7.0	100	276	20	12	5.5	4.0	4.0	2.5
26.....	9.5	105	246	20	9.5	4.0	4.0	4.0	4.0
27.....	7.0	108	168	20	24	5.5	5.5	4.0	1.0
28.....	6.4	126	146	20	20	4.0	4.6	4.0	1.0
29.....	9.5	168	126	12	20	4.0	4.0	12.0	4.0
30.....	9.5	192	108	12	16	4.0	4.0	12.0	1.0
31.....	7.0	108	12	4.0	12.0

NOTE.—Discharge determined from a rating curve well defined below 40 second-feet. Discharge Mar. 1-18 estimated at 5.5 second-feet. Mean discharge January, February, and December estimated.

Monthly discharge of North Laramie River near Wheatland, Wyo., for 1912.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accu- racy.
	Maximum.	Minimum.	Mean.		
January.....			α 4.50	277	D.
February.....			α 5.00	288	D.
March.....	12	5.5	6.84	420	C.
April.....	345	7.0	94.5	5,620	C.
May.....	580	108	317	19,500	D.
June.....	108	12	51.3	3,050	B.
July.....	24	5.5	12.3	756	A.
August.....	108	4.0	10.4	640	A.
September.....	5.5	4.0	4.07	242	A.
October.....	12	2.5	4.39	270	A.
November.....	12	1.0	6.58	392	A.
December.....			α 5.50	338	D.
The year.....	580		43.5	31,800	

α Estimated.

NORTH LARAMIE RIVER AT UVA, WYO.

Location.—At highway bridge, in sec. 20, T. 25 N., R. 67 W., one-fourth mile west of Uva, 800 feet above the mouth.

Records available.—May 21, 1911, to October 31, 1912.

Drainage area.—Not measured.

Gage.—Vertical staff.

Channel.—It is probable that the station is within the influence of backwater from Laramie River during high water. This is the only section on the lower river where an observer can be obtained.

Discharge measurements.—Made from bridge during high water and by wading at ordinary stages.

Winter flow.—Ice causes backwater during the winter months and the records are discontinued.

Diversions.—Prior to July 1, 1912, there were adjudicated diversions from North Laramie of 59 second-feet and from the tributaries 70 second-feet. These diversions are all above the station.

Accuracy.—The station has not been completely rated and no estimates of flow have been made.

Discharge measurements of North Laramie River at Uva, Wyo., in 1912.

Date.	Hydrographer.	Gage height.	Dis-charge.	Date.	Hydrographer.	Gage height.	Dis-charge.
		<i>Feet.</i>	<i>Sec.-ft.</i>			<i>Feet.</i>	<i>Sec.-ft.</i>
Mar. 15 ^a	R. H. Fletcher	0.75	4.7	July 27	R. H. Fletcher		1.0
May 21do.....	4.00	531	Aug. 31do.....	0.97	8.1
June 25do.....	1.04	35.0	Oct. 24do.....	1.00	10.7

^a Relation of gage height to discharge affected by ice in stream.

Daily gage height, in feet, of North Laramie River at Uva, Wyo., for 1912.

[Marion Ralston, observer.]

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
1.		0.75	2.82	2.35	0.80	0.58	0.92	0.92
2.		.78	2.88	2.15	.85	1.8	.90	.92
3.		.80	3.5	1.92	.80	1.85	.90	.92
4.		.85	3.12	1.78	.82	1.42	.90	.92
5.		.85	2.5	1.58	.80	1.1	.88	.92
6.		.85	2.28	1.5	.78	.85	.88	.92
7.		.85	2.2	1.42	.75	.75	.88	.92
8.		.90	2.52	1.4	.75	.75	.88	.92
9.		.98	2.98	1.4	.72	.75	.88	.92
10.		2.18	3.48	1.48	.68	.75	1.02	.98
11.		2.92	4.22	1.4	.62	.75	1.18	1.0
12.		2.78	3.5	2.15	.65	.68	.95	1.0
13.		2.8	3.15	2.15	.60	.65	.95	1.0
14.		2.0	3.02	2.05	.60	.60	.98	.98
15.		1.4	2.82	1.62	.58	1.45	.97	.99
16.		1.25	2.8	1.4	.55	2.0	.96	1.0
17.	0.70	1.22	3.0	1.4	.50	1.38	.94	1.0
18.	.70	1.25	3.2	1.32	.50	1.55	.92	1.0
19.	.75	1.25	3.5	1.28	.50	1.25	.92	1.0
20.	.85	1.72	3.78	1.2	.50	1.1	.92	1.0
21.	.75	1.78	4.0	1.15	.50	1.08	.92	1.0
22.	.78	1.6	3.85	1.08	.50	1.0	.90	1.0
23.	.70	1.58	3.52	.98	.48	1.0	.90	1.0
24.	.72	1.6	3.25	.98	.45	1.0	.92	1.0
25.	.70	1.7	3.05	1.0	.45	1.0	.95	1.0
26.	.72	1.92	2.92	.92	.45	.98	.92	1.0
27.	.75	2.05	2.78	.85	.52	.95	.95	1.0
28.	.75	2.05	2.65	.80	.50	.95	.95	1.0
29.	.78	2.22	2.42	.80	.50	.95	.95	1.0
30.	.80	2.5	2.22	.80	.50	.95	.92	1.01
31.	.78		2.38		.55	.96		1.02

CHUGWATER CREEK AT CHUGWATER, WYO.

Location.—At highway bridge in sec. 31, T. 21 N., R. 66 W., one-half mile from Chugwater. No important tributaries within several miles of the station.

Records available.—May 22, 1911, to November 6, 1912.

Drainage area.—Not measured.

Gage.—Vertical staff, which was moved upstream February 6, 1912. All 1912 gage heights are referred to the present gage.

Channel.—Reasonably permanent control for the original station was formed by a low diversion dam about 300 feet below the gage. February 6, 1912, the station was moved 300 feet upstream to be out of the influence of this dam.

Discharge measurements.—Made from bridge during high water and by wading at ordinary stages.

Winter flow.—Ice causes backwater during the winter months and discharge measurements are made to determine the flow.

Diversions.—Prior to July 1, 1912, there were adjudicated diversions from Chugwater Creek of 178 second-feet and from the tributaries entering above the station 72 second-feet.

Accuracy.—Conditions are favorable for accurate results and the estimates should be reliable.

Cooperation.—Station maintained in cooperation with the Swan Land & Cattle Co., which furnished many of the discharge measurements.

Discharge measurements of Chugwater Creek at Chugwater, Wyo., in 1912.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		<i>Feet.</i>	<i>Sec.-ft.</i>			<i>Feet.</i>	<i>Sec.-ft.</i>
Feb. 16	R. H. Fletcher.....	1.20	3.1	May 3	F. Johnston.....	2.09	55.9
Mar. 16do.....	4.0	11do.....	2.51	108
28	F. Johnston.....	1.53	13.4	22	R. H. Fletcher.....	3.00	159
29do.....	1.78	28.9	June 23do.....	1.60	18.0
Apr. 1do.....	1.66	20.4	Sept. 1do.....	5.0
23do.....	1.87	37.0	Oct. 23do.....	1.80	30.7
25do.....	1.96	43.0				

Daily gage height, in feet, of Chugwater Creek at Chugwater, Wyo., for 1912.

[A. H. Woolwer, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	1.2	1.17	1.23	1.6	1.95	2.35	1.3	1.6	1.5	1.85	1.8
2	1.2	1.17	1.24	1.65	2.0	2.25	1.38	1.9	1.5	1.8	1.8
3	1.2	1.17	1.24	1.7	2.05	2.2	1.28	3.7	1.5	1.8	1.8
4	1.2	1.18	1.23	1.75	2.1	2.1	1.3	2.5	1.49	1.8	1.8
5	1.2	1.19	1.23	1.75	2.15	2.05	1.3	2.3	1.46	1.75	1.8
6	1.19	1.19	1.23	1.7	2.15	2.0	1.28	2.15	1.43	1.75	1.8
7	1.21	1.19	1.24	1.7	2.15	1.95	1.27	2.1	1.4	1.75	1.8
8	1.19	1.19	1.24	1.7	2.15	1.9	1.24	2.1	1.4	1.75	1.8
9	1.19	1.19	1.24	1.75	2.2	1.85	1.24	2.0	1.4	1.75	1.8
10	1.21	1.19	1.24	1.7	2.35	1.8	1.55	1.9	2.6	1.8	1.8
11	1.21	1.19	1.25	1.75	2.5	1.8	1.38	1.85	3.2	1.85	1.8
12	1.21	1.19	1.25	1.7	2.5	2.1	1.32	1.8	2.8	1.85	1.8
13	1.2	1.19	1.25	1.45	2.5	2.0	1.32	1.8	2.4	1.85	1.8
14	1.2	1.19	1.25	1.7	2.5	1.9	1.32	1.8	2.1	1.85	1.8
15	1.2	1.21	1.26	1.6	2.45	1.8	1.34	1.8	2.05	1.85	1.8
16	1.2	1.21	1.26	1.65	2.4	1.8	1.32	2.0	2.0	1.85	1.8
17	1.2	1.2	1.24	1.65	2.4	1.8	1.3	2.1	2.0	1.85	1.8
18	1.21	1.21	1.27	1.65	2.5	1.75	1.3	2.0	1.95	1.8	1.8
19	1.19	1.22	1.29	1.8	2.8	1.7	1.34	1.8	1.95	1.8	1.8
20	1.2	1.21	1.29	1.85	2.85	1.7	1.38	1.8	1.85	1.8	1.8
21	1.2	1.22	1.32	1.85	2.9	1.65	1.37	1.75	1.85	1.8	1.8
22	1.2	1.22	1.35	1.85	2.9	1.65	1.35	1.7	1.85	1.8	1.8
23	1.2	1.23	1.34	1.8	2.95	1.6	1.35	1.65	1.8	1.8	1.8
24	1.2	1.22	1.36	1.9	2.85	1.55	1.35	1.65	1.8	1.8	1.8
25	1.19	1.23	1.38	1.9	2.7	1.51	1.35	1.6	1.8	1.8	1.8
26	1.19	1.24	1.41	1.95	2.65	1.44	2.1	1.6	1.8	1.8	1.8
27	1.19	1.24	1.45	1.9	2.65	1.39	1.55	1.6	1.8	1.8	1.8
28	1.19	1.24	1.53	1.9	2.6	1.32	1.35	1.6	1.8	1.8	1.8
29	1.17	1.23	1.71	1.9	2.55	1.3	1.35	1.55	1.8	1.8	1.8
30	1.17	1.64	1.9	2.5	2.5	1.3	1.35	1.52	1.9	1.8	1.8
31	1.17	1.59	2.45	2.45	2.45	1.35	1.5	1.46	1.8	1.8	1.8

NOTE.—Relation of gage height to discharge affected by ice Jan. 1 to Feb. 29.

Daily discharge, in second-feet, of Chugwater Creek at Chugwater, Wyo., for 1911-12.

Day.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Day.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1911.								1911.							
1		2	1	2	2	4	6	16		26	4	2	2	5	15
2		1	1	2	2	4	8	17		2	3	2	2	5	15
3		1	1	2	2	4	8	18		1	2	2	2	5	14
4		1	1	2	2	2	8	19		1	2	42	2	5	14
5		1	1	2	2	3	8	20		1	2	10	2	5	13
6		1	1	2	2	3	10	21		1	2	5	2	5	13
7		1	1	2	3	3	10	22		3	1	3	2	5	8
8		1	1	2	3	2	15	23		3	1	5	2	6	5
9		1	1	2	3	2	13	24		3	1	6	2	5	5
10		1	1	2	2	2	10	25		3	1	2	2	5	8
11		1	1	2	2	2	8	26		2	1	2	5	2	11
12		1	1	2	2	2	6	27		3	1	2	2	5	5
13		1	1	2	2	2	5	28		2	1	2	2	6	5
14		1	62	2	2	2	3	29		2	1	2	2	6	5
15		1	13	2	2	5	12	30		2	1	2	2	6	3
								31		2	2	2	2	6	

Daily discharge, in second-feet, of Chugwater Creek at Chugwater, Wyo., for 1911-12—
Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1912.											
1.	3	2	4	18	42	84	6	18	14	33	29
2.	3	2	4	20	47	74	9	35	14	29	29
3.	3	2	4	23	52	68	5	245	14	29	29
4.	3	3	4	26	57	57	6	102	14	29	29
5.	3	3	4	26	62	52	6	79	12	26	29
6.	3	3	4	23	62	47	5	62	11	26	29
7.	3	3	4	23	62	42	5	57	10	26	29
8.	3	3	4	23	62	37	4	57	10	26	
9.	3	3	4	26	68	33	4	47	10	26	
10.	3	3	4	23	84	29	16	37	114	29	
11.	3	3	4	26	102	29	9	33	186	33	
12.	3	3	4	23	102	57	7	29	138	33	
13.	3	3	4	12	102	47	7	29	90	33	
14.	3	3	4	23	102	37	7	29	57	33	
15.	3	3	5	18	96	29	8	29	52	33	
16.	3	3	5	20	90	29	7	47	47	33	
17.	3	3	4	20	90	29	6	57	47	33	
18.	3	3	5	20	102	26	6	47	42	29	
19.	3	4	6	29	138	23	8	29	42	29	
20.	3	3	6	33	144	23	9	29	33	29	
21.	3	4	7	33	150	20	9	26	33	29	
22.	3	4	8	33	150	20	8	23	33	29	
23.	3	4	8	29	156	18	8	20	29	29	
24.	3	4	8	37	144	16	8	20	29	29	
25.	3	4	9	37	126	14	8	18	29	29	
26.	3	4	10	42	120	11	57	18	29	29	
27.	3	4	12	37	120	10	16	18	31	29	
28.	3	4	15	37	114	7	8	18	33	29	
29.	2	4	24	37	108	6	8	16	35	29	
30.	2		20	37	102	6	8	15	37	29	
31.	2		18		96		8	14		29	

NOTE.—Discharge 1911-12 determined from a well-defined rating curve.

Monthly discharge of Chugwater River at Chugwater, Wyo., for 1911-12.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accu- racy.
	Maximum.	Minimum.	Mean.		
1911.					
May 22-30.	3	2	2.50	50	A.
June.	26	1	1.90	113	A.
July.	62	1	4.13	254	A.
August.	42	2	4.29	264	A.
September.	3	2	2.10	129	A.
October.	6	2	4.10	252	A.
November.	15	3	9.27	552	A.
December.			3.00	184	A.
The period.				1,800	
1912.					
January.	3	2	2.91	179	A.
February.	4	3	3.24	186	A.
March.	24	4	7.29	448	A.
April.	42	12	27.1	1,610	A.
May.	156	42	98.5	6,050	A.
June.	84	6	32.7	1,950	A.
July.	57	4	9.23	568	A.
August.	245	14	42.2	2,590	A.
September.	186	10	42.5	2,530	A.
October.	33	26	29.5	1,810	A.
November.	29	29	29.0	404	A.
The period.				18,300	

α Estimated.

HORSE CREEK NEAR LITTLE HORSE CREEK, WYO.

Location.—At upper Coad ranch, in sec. 10, T. 18 N., R. 62 W., 1 mile from Little Horse Creek post office; 1 mile above mouth of Little Horse Creek, the nearest tributary.

Records available.—December 1, 1911, to September 25, 1912.

Drainage area.—Not measured.

Gage.—Vertical staff.

Channel.—Data too meager to determine.

Discharge measurements.—Made by wading.

Diversions.—Prior to July 1, 1912, there were adjudicated diversions from Horse Creek of 1,216 second-feet, nearly all below the station.

Accuracy.—No estimates of discharge have been made, as base data are insufficient.

Cooperation.—Station maintained in cooperation with Mr. J. A. Whiting, of Cheyenne.

Discharge measurements of Horse Creek near Little Horse Creek, Wyo., in 1912.

Date.	Hydrographer.	Gage height.	Discharge.
Feb. 2 ^a	R. H. Fletcher	<i>Feet.</i> 3.20	<i>Sec.-ft.</i> 17.9
May 20do.....	1.32	20.9

^a Ice conditions.

Daily gage height, in feet, of Horse Creek near Little Horse Creek, Wyo., for 1912.

[Ray Coad, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	Aug.	Sept.	Day.	Jan.	Feb.	Mar.	Apr.	May.	Aug.	Sept.
1	2.2			5.9			1.6	16							
2		3.2		5.6	1.6			17						2.8	
3	2.2			5.9		2.8		18				2.8		2.9	
4				5.8		2.5		19						2.7	
5						2.1		20					1.32	2.6	1.5
6	2.2			4.8	1.5	1.9		21						2.5	
7	2.2			4.6		1.7		22					1.7	1.8	
8	2.3			4.3	1.7	1.6		23						1.6	
9	2.3							24				1.8		1.6	
10	2.3			3.9	1.8	1.6	1.5	25							1.3
11	2.3				1.7			26			4.2				
12	2.6			3.6	1.7			27				1.6			
13	2.7							28							
14								29							
15				3.9	1.7		1.5	30							
								31			4.3				

NOTE.—Gage height: Jan. 1 to Apr. 18 affected by ice.

HORSE CREEK NEAR LAGRANGE, WYO.

Location.—At Wye Cross ranch, about sec. 28, T. 20 N., R. 61 W., 3 miles above LAGRANGE, Wyo., 1 mile below mouth of Bear Creek.

Records available.—December 1, 1911, to December 31, 1912.

Drainage area.—Not measured.

Gage.—Vertical staff.

Channel.—Data too meager to determine.

Discharge measurements.—Made from bridge during high water and by wading at ordinary stages.

Winter flow.—Ice causes backwater during the winter months.

Diversions.—Prior to July 1, 1912, there were adjudicated diversions from Horse Creek of 1,216 second-feet and of 224 second-feet from tributaries entering above the station.

Accuracy.—Data insufficient for estimates of daily and monthly discharge.

Cooperation.—Station maintained in cooperation with Mr. J. A. Whiting of Cheyenne.

Discharge measurements of Horse Creek at Lagrange, Wyo., in 1912.

Date.	Hydrographer.	Gage height.	Dis-charge.
Feb. 2	R. H. Fletcher.....	<i>Feet.</i> 1.40	<i>Sec.-ft.</i> 42.0
May 20do.....	.30	7.9

Daily gage height, in feet, of Horse Creek near Lagrange, Wyo., for 1912.

[Ogden Whipple, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	Sept.	Oct.	Dec.
1.....	3.7	1.5	1.7	2.4	1.1	-----	1.55	-----
2.....	3.7	1.4	1.7	2.4	1.0	-----	1.5	-----
3.....	3.7	1.3	1.7	2.4	1.0	-----	1.5	-----
4.....	3.7	1.4	1.7	2.3	1.0	-----	1.55	-----
5.....	3.7	1.4	1.7	2.2	.9	-----	1.55	-----
6.....	3.7	1.3	1.8	2.1	.8	-----	1.5	-----
7.....	3.7	1.3	1.7	2.1	.8	-----	1.55	-----
8.....	3.7	1.2	1.7	1.9	.8	-----	1.6	1.8
9.....	3.7	1.3	1.7	1.5	.7	-----	1.6	1.8
10.....	3.7	1.3	1.4	1.3	.7	-----	1.65	1.85
11.....	3.7	1.4	1.2	1.0	.7	-----	1.6	1.85
12.....	3.7	1.4	1.3	.8	.7	-----	1.6	1.8
13.....	3.7	1.4	1.3	.8	.7	-----	-----	1.8
14.....	3.7	1.5	2.8	-----	.7	-----	-----	1.85
15.....	3.7	1.4	2.8	-----	.7	-----	-----	1.8
16.....	3.7	1.4	2.8	-----	.7	-----	-----	1.8
17.....	3.7	1.4	2.8	-----	.6	-----	-----	1.8
18.....	3.7	1.2	2.8	-----	.5	-----	-----	1.75
19.....	3.7	2.4	2.8	-----	-----	-----	-----	1.75
20.....	3.7	1.4	2.8	-----	-----	-----	-----	1.8
21.....	1.7	1.0	2.8	3.0	-----	-----	-----	1.8
22.....	1.6	1.0	3.0	2.8	-----	1.7	-----	1.8
23.....	1.5	1.0	3.0	2.6	-----	1.7	-----	1.8
24.....	1.6	1.0	3.0	2.5	-----	1.75	-----	1.7
25.....	1.7	1.2	3.0	2.4	-----	1.65	-----	1.75
26.....	1.5	1.4	2.8	2.0	-----	1.6	-----	1.8
27.....	1.5	1.7	2.7	1.8	-----	1.6	-----	1.8
28.....	1.5	1.7	2.7	1.6	-----	1.65	-----	1.8
29.....	1.5	1.7	2.4	1.4	-----	1.55	-----	1.8
30.....	1.5	-----	2.4	1.2	-----	1.5	-----	1.8
31.....	1.5	-----	2.4	-----	-----	-----	-----	1.7

NOTE.—Relation of gage height to discharge Jan. 1-20 and Feb. 19 and 20 affected by ice.

MIDDLE FORK OF SOUTH PLATTE RIVER AT FAIRPLAY, COLO.

Location.—At the highway bridge at Fairplay, in sec. 33, T. 9 S., R. 77 W., 1 mile above the mouth of Beaver Creek and about 3 miles below the mouth of Sacramento Creek.

Records available.—October 17, 1910, to July 6, 1912.

Drainage area.—Not measured.

Gage.—Vertical staff.

Channel.—Somewhat shifting.

Discharge measurements.—Made by wading.

Winter flow.—Ice causes backwater during the winter months.

Diversions.—There are no court decrees for diversions from the Middle Fork above the station, but decrees for diversions of 1,092 second-feet below. There are also decrees for diversions of 147 second-feet from tributaries entering above.

Accuracy.—As the station has not been completely rated, no estimates of discharge have been made.

Cooperation.—Station maintained in cooperation with the United States Forest Service.

Discharge measurements of Middle Fork of South Platte River at Fairplay, Colo., in 1912.

Date.	Hydrographer.	Gage height.	Discharge.
Jan. 12 ^a	H. B. Waha.....	<i>Feet.</i> 1.50	<i>Sec.-ft.</i> 11.6
Apr. 5do.....	.95	7.1

^a Relation of gage height to discharge only slightly affected by ice. Stream open at measuring section.

Daily gage height, in feet, of Middle Fork of South Platte River at Fairplay, Colo., for 1912.

[J. F. Low, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.
1				0.8	1.05		2.6	16		0.95		.8	1.3		
2	0.95					2.0	2.6	17				.8	1.3	2.1	
3				1.0	1.1	2.0		18				.8	1.3	2.1	
4			1.0	.9	1.2		2.6	19				.8	1.3		
5			1.0	1.0		2.2		20				.8			
6	1.0			1.0	1.1	2.35	2.4	21	1.0				1.5	2.0	
7	1.05				1.2	2.4		22	1.05			.9	1.6	2.0	
8	1.0			.9	1.15			23	1.05		1.0	.9	1.65		
9	.95	0.95		.9	1.2	2.4		24	1.05			.8			
10	1.05	.95						25				.9	1.8		
11		.9		.9	1.2			26				.9		2.5	
12		.95		.85	1.2	2.2		27		1.1		.95	1.8	2.65	
13	.95			.8		2.2		28		1.0	.8		1.8	2.6	
14		1.0		.8		2.2		29			.8			2.6	
15		1.0		.8				30	1.1		1.0		2.0		
								31	1.1		.9		2.0		

NOTE.—Relation of gage height to discharge Jan. 1 to Mar. 23 affected by ice.

SOUTH FORK OF SOUTH PLATTE RIVER AT LAKE GEORGE, COLO.

Location.—At highway bridge in sec. 19, T. 12 S., R. 71 W., one-fourth mile below Lake George, in the Pike National Forest, about 2 miles above the mouth of Caylor Gulch; no tributary between the outlet of the lake and the station.

Records available.—October 22, 1910, to September 30, 1912.

Drainage area.—Not measured.

Gage.—Automatic recording gage installed by State Engineer in 1911, reading to the same datum as the original staff gage.

Channel.—Conditions in the channel will remain unchanged as long as the control for the station—a 2-foot timber-crib dam, 50 feet below the gage—remains permanent. There was no change during 1912.

Discharge measurements.—Made from bridge during high water and by wading at ordinary stages.

Winter flow.—Ice causes backwater during the winter months and measurements are made to determine the flow.

Artificial control.—The discharge at the station is controlled naturally to some extent by the regulating effect of Lake George, which has an area of one-half square mile. It is also controlled by the antero reservoir located 45 miles upstream.

Diversions.—There are court decrees for diversions of 1,076 second-feet from the South Fork above this station and the diversions of 1,926 second-feet from tributaries entering above.

Accuracy.—Conditions are favorable for accurate results and the estimates are considered reliable.

Cooperation.—Station maintained in cooperation with United States Forest Service and the State engineer of Colorado.

Discharge measurements of South Fork of South Platte River at Lake George, Colo., in 1912.

Date.	Hydrographer.	Gage height.	Discharge.
		<i>Feet.</i>	<i>Sec.-ft.</i>
Jan. 18 ^a	H. B. Waha.....	1.05	0.8
Mar. 13 ^ado.....	.90	.4
May 2do.....	1.55	20.1
June 20do.....	2.60	308

^a Relation of gage height to discharge affected by ice. Stream open at measuring section but frozen over at gage.

Daily gage height, in feet, of South Fork of South Platte River at Lake George, Colo., for 1912.

[F. C. Parrett, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1.....		0.90	0.85	1.45	1.50	2.15	2.95	2.95	1.65
2.....		1.00	.85	1.50	1.55	2.05	2.65	2.85	1.60
3.....		.95	.80	1.60	1.35	1.95	2.20	2.65	1.60
4.....	1.0	.85	.70	1.65	1.25	2.00	2.40	2.55	1.50
5.....	1.10	.85	.75	1.65	1.15	2.35	4.50	2.30	1.50
6.....	1.10	.90	.85	1.90	1.10	2.40	4.00	2.20	1.55
7.....	1.25	.95	.85	1.90	1.10	2.60	2.40	2.20	1.60
8.....	1.10	.95	.80	2.10	1.30	2.80	2.80	2.20	1.65
9.....	1.05	.95	.80	2.20	1.50	2.80	3.00	2.25	1.65
10.....	1.10	1.0	.95	2.05	1.55	2.70	3.20	2.15	1.60
11.....	1.00	.95	.80	1.75	1.55	2.45	3.20	2.10	1.60
12.....	.95	.90	.80	1.65	1.60	2.50	3.20	2.00	1.70
13.....	.95	.90	.90	1.65	1.55	2.45	3.20	1.95	1.80
14.....	.85	.90	.80	1.45	1.65	2.40	3.20	2.00	1.55
15.....	.90	.90	.85	1.40	1.65	2.30	3.20	2.20	1.50
16.....	1.05	1.0	1.00	1.45	1.70	2.20	2.90	2.30	1.80
17.....	1.05	1.0	.90	1.45	1.75	2.20	2.70	2.20	1.80
18.....	1.05	1.0	.95	1.55	1.80	2.50	2.60	2.15	1.80
19.....	1.00	.90	1.20	1.60	1.75	2.55	2.65	2.05	1.80
20.....	1.10	.80	1.45	1.65	1.65	2.45	2.65	1.90	1.80
21.....	1.0	.85	1.50	1.45	1.55	2.25	2.55	1.95	1.80
22.....	.95	.95	1.65	1.65	1.65	2.15	2.40	1.95	1.80
23.....	.95	1.00	1.55	1.55	1.50	2.20	2.45	1.90	1.80
24.....	1.05	.85	1.55	1.60	1.50	2.30	2.65	1.90	1.80
25.....	1.05	.8	1.60	1.45	1.65	2.50	2.75	1.80	1.80
26.....	1.10	.8	1.65	1.40	1.70	2.65	2.85	1.80	1.80
27.....	1.20	.8	1.65	1.50	1.70	2.75	2.95	1.70	1.75
28.....	1.05	.8	1.60	1.40	1.85	2.85	2.85	1.70	1.75
29.....	.95	.85	1.75	1.50	1.85	3.10	3.20	1.65	1.75
30.....	.95		1.55	1.50	1.70	3.15	3.10	1.65	1.75
31.....	.90		1.55		1.65		3.10	1.70	

NOTE.—Relation of gage height to discharge Jan. 1 to Mar. 13 affected by ice.

Daily discharge, in second-feet, of South Fork of South Platte River at Lake George, Colo., for 1911-12.

Day.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1911.											
1.....		1.5	86	3.5	6.5	140	170	86	40	28	15
2.....		5.0	86	6.5	6.5	235	170	86	40	28	13
3.....		5.0	67	6.5	6.5	850	140	86	24	31	
4.....		2.0	86	6.5	5.0	780	140	76	15	36	
5.....		8.0	60	9.5	3.5	850	125	67	22	36	
6.....		5.0	40	9.5	5.0	710	110	67	52	36	
7.....		8.0	28	6.5	24	675	98	60	86	31	
8.....		11	17	11	46	745	86	60	76	31	
9.....		17	17	11	76	580	86	60	36	31	
10.....		40	13	8.0	67	410	86	52	31	31	
11.....		46	19	6.5	60	110	98	52	40	17	
12.....		13	19	6.5	52	140	125	52	22	22	
13.....		17	9.5	6.5	60	110	110	46	9.5	22	
14.....		28	6.5	5.0	125	190	98	46	31	19	
15.....		31	8.0	9.5	170	170	98	60	31	24	
16.....		36	6.5	15	210	210	86	67	28	24	
17.....	6.5	31	11	19	235	125	98	67	28	19	
18.....	5.0	36	11	22	235	98	110	52	24	19	
19.....	6.5	24	11	22	360	125	98	40	24	15	
20.....	3.5	31	8.0	17	385	140	86	40	22	15	
21.....	1.0	40	11	22	385	235	98	46	19	19	
22.....	1.0	31	11	24	385	260	110	52	19	24	
23.....	1.0	36	8.0	24	435	285	155	52	31	31	
24.....	5.0	52	11	19	360	310	190	86	67	28	
25.....	5.0	76	13	19	210	335	170	125	67	28	
26.....	1.5	31	15	19	170	360	98	40	36	31	
27.....	5	31	13	17	140	310	98	40	36	22	
28.....	1.0	36	11	11	155	235	98	40	36	17	
29.....	1.0	76	9.5	11	155	170	98	40	19	19	
30.....		40	6.5	6	140	190	86	40	13	15	
31.....		22		8.0		170	86		24		
Day.					Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1912.											
1.....						22	24	125	490	490	36
2.....						24	28	98	335	435	31
3.....						31	17	76	140	335	31
4.....						36	13	86	210	285	24
5.....						36	9.5	190	1,540	170	24
6.....						67	8.0	210	1,190	140	28
7.....						67	8.0	310	210	140	31
8.....						110	15	410	410	140	36
9.....						140	24	410	520	155	36
10.....						98	28	360	640	125	31
11.....						46	28	235	640	110	31
12.....						36	31	260	640	86	40
13.....						36	28	235	640	76	52
14.....					1.0	22	36	210	640	86	28
15.....					1.5	19	36	170	640	140	24
16.....					5.0	22	40	140	460	170	52
17.....					2.0	22	46	140	360	140	52
18.....					3.5	28	52	260	310	125	52
19.....					11	31	46	285	335	98	52
20.....					22	36	36	235	335	67	52
21.....					24	22	28	155	285	76	52
22.....					36	36	36	125	210	76	52
23.....					28	28	24	140	235	67	52
24.....					28	31	24	170	335	67	52
25.....					31	22	36	260	385	52	52
26.....					36	19	40	335	435	52	52
27.....					36	24	40	385	490	40	46
28.....					31	19	60	435	435	40	46
29.....					46	24	60	580	640	36	46
30.....					28	24	40	615	580	36	46
31.....					28		36		580	40	

NOTE (1911).—Discharge determined from a well-defined rating curve. Mean discharge January, February, and December estimated.

(1912).—Mean discharge January and February estimated; mean discharge Mar. 1-13 estimated at 5 second-feet. Daily discharge determined from a well-defined rating curve.

Monthly discharge of South Fork of South Platte River at Lake George, Colo., for 1911-12.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accu- racy.
	Maximum.	Minimum.	Mean.		
1911.					
January.....			a 2.0	123	D.
February.....			a 4.0	222	D.
March.....	76	1.5	28.0	1,720	B.
April.....	86	6.5	24.0	1,430	B.
May.....	24	3.5	12.5	769	B.
June.....	435	3.5	156	9,280	B.
July.....	850	98	331	20,400	B.
August.....	190	86	113	6,950	B.
September.....	86	40	59.4	3,530	B.
October.....	86	9.5	33.8	2,080	B.
November.....	36	15	25.0	1,490	B.
December.....			a 7.0	430	D.
The year.....	850		66.3	48,400	
1912.					
January.....			a 1.0	61	D.
February.....			a .50	29	D.
March.....	46		13.1	805	C.
April.....	140	19	39.3	2,340	B.
May.....	60	8.0	31.5	1,940	B.
June.....	615	76	255	15,200	B.
July.....	1,540	140	493	30,300	B.
August.....	490	36	132	8,120	B.
September.....	52	24	41.3	2,460	B.
The period.....				61,300	

a Estimated.

SOUTH FORK OF SOUTH PLATTE RIVER AT SOUTH PLATTE, COLO.

Location.—In sec. 25, T. 7 S., R. 70 W., in the Pike National Forest, half a mile east of South Platte, and 600 feet above junction with the North Fork.

Records available.—May 8, 1905, to December 1, 1912.

Drainage area.—2,160 square miles.

Gage.—Inclined staff; datum unchanged.

Channel.—Shifting, requiring frequent measurements.

Discharge measurements.—Made from car and cable during high water and by wading at ordinary stages.

Winter flow.—Ice causes backwater during the winter months and measurements are made to determine the flow.

Artificial control.—The flow is controlled to a certain extent by the Cheesman reservoir, 20 miles upstream, which has a capacity of 79,000 acre-feet. No very important tributaries enter between the reservoir and this station.

Diversions.—There are no court decrees for diversions from the South Fork between this station and the one at Lake George, but decrees for diversion of 1,400 second-feet from intervening tributaries.

Accuracy.—Although the channel is shifting, sufficient discharge measurements have been made to enable fair estimates of discharge to be made.

Cooperation.—Station maintained in cooperation with the State engineer.

Discharge measurements of South Fork of South Platte River at South Platte, Colo., in 1912.

Date.	Hydrographer.	Gage height.	Dis-charge.	Date.	Hydrographer.	Gage height.	Dis-charge.
		<i>Feet.</i>	<i>Sec.-ft.</i>			<i>Feet.</i>	<i>Sec.-ft.</i>
Jan. 4 ^a	G. H. Russell.....	3.60	108	July 2	Follansbee and Gray...	4.83	1,160.
29 ^a	do.....	1.70	35.0	Aug. 7	Robert Follansbee.....	3.50	644
Feb. 27 ^a	do.....	2.22	43.7	Sept. 14	R. H. Fletcher.....	2.70	275
Apr. 29	G. A. Gray.....	1.60	49.4	Oct. 23	R. Richards.....	1.98	102
June 1	do.....	2.40	120	Nov. 15	Fletcher and Grieve....	1.90	106

^a Relation of gage height to discharge affected by ice at control.

Daily gage height, in feet, of South Fork of South Platte River at South Platte, Colo., for 1912.

[A. Vermillion, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1.....	1.8	1.6	3.0	1.5	1.8	2.5	5.0	4.9	2.3	2.5	2.1	2.0
2.....	3.5	3.6	3.0	1.5	1.8	2.5	5.3	4.7	2.3	2.5	2.1
3.....	3.9	3.5	2.0	1.6	1.7	2.6	5.0	4.6	3.0	2.5	2.1
4.....	3.65	3.6	2.5	2.2	1.7	3.2	4.2	4.3	3.3	2.4	2.1
5.....	3.4	3.9	1.6	2.0	1.7	3.3	3.7	3.9	3.1	2.3	2.1
6.....	2.6	3.7	2.9	2.0	1.7	3.5	3.7	3.5	3.0	2.2	2.8
7.....	2.8	3.5	1.9	1.8	1.8	3.6	3.4	3.5	3.0	2.2	3.0
8.....	1.8	3.5	1.6	1.8	1.6	4.1	3.7	3.4	2.9	2.2	3.0
9.....	3.6	3.3	1.6	1.8	1.8	4.5	3.0	3.4	3.0	2.2	3.0
10.....	2.9	3.2	2.0	1.8	2.0	4.6	2.9	3.3	3.0	2.4	2.8
11.....	2.5	3.0	2.5	2.0	2.0	2.8	2.7	3.2	3.0	2.4	2.5
12.....	2.3	2.2	2.5	1.8	2.0	2.8	2.6	3.1	3.0	2.2	2.4
13.....	2.1	2.1	2.0	1.7	2.0	2.8	2.6	3.0	3.0	2.1	2.2
14.....	2.0	2.0	1.5	1.6	2.0	2.7	2.8	3.0	2.8	2.1	2.0
15.....	1.9	2.1	1.3	1.6	2.1	2.7	3.2	3.3	2.6	2.1	2.0
16.....	1.8	2.2	2.0	1.6	2.4	2.7	3.9	3.3	2.6	2.5	2.0
17.....	1.8	2.1	2.0	1.5	2.5	3.5	3.9	3.0	2.6	2.4	2.0
18.....	1.7	2.1	1.8	1.5	2.5	4.2	3.9	3.2	1.8	2.2	2.0
19.....	1.7	1.9	1.5	1.6	2.6	4.8	3.7	3.1	2.8	2.2	2.0
20.....	1.5	1.9	1.5	1.6	2.7	4.8	3.7	3.0	2.8	2.2	2.0
21.....	2.0	2.0	1.3	1.5	2.6	4.5	4.0	3.0	2.8	2.2	2.0
22.....	2.1	2.1	1.5	1.5	2.5	4.0	3.5	3.0	2.8	2.1	2.0
23.....	2.0	1.8	1.5	1.6	2.5	4.0	3.9	2.9	2.6	2.1	2.0
24.....	2.1	1.5	1.5	1.6	2.5	3.9	3.7	2.8	2.5	2.1	2.0
25.....	1.7	1.8	1.5	1.6	2.5	4.2	4.1	2.7	2.5	2.1	2.0
26.....	1.7	1.8	1.5	1.6	2.5	4.3	4.1	2.7	2.5	2.1	1.8
27.....	1.7	2.4	1.5	1.7	2.4	4.4	4.6	3.1	2.5	2.1	1.8
28.....	1.5	3.0	1.5	1.7	2.4	4.8	4.4	3.0	2.5	2.1	1.8
29.....	1.3	2.5	1.5	1.7	2.4	4.7	4.6	3.0	2.4	2.1	2.0
30.....	1.5	1.5	1.8	2.5	5.0	4.6	2.7	2.1	2.1	2.0
31.....	1.6	1.5	2.5	4.7	2.3	2.1

NOTE.—Relation of gage height to discharge affected by ice Jan. 1 to Mar. 21 and Nov. 15 to Dec. 1.

Daily discharge, in second-feet, of South Fork of South Platte River at South Platte, Colo., for 1912.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1.....	40	60	140	1,250	1,280	165	220	135
2.....	40	60	160	1,400	1,180	165	220	135
3.....	45	50	185	1,250	1,130	378	220	135
4.....	100	50	380	870	995	488	190	150
5.....	80	50	415	650	815	414	165	150
6.....	80	50	485	650	640	378	140	365
7.....	60	60	525	528	640	378	140	440
8.....	60	45	735	650	600	343	140	440
9.....	60	60	915	378	600	378	140	440
10.....	60	80	995	343	560	378	190	365

Daily discharge, in second-feet, of South Fork of South Platte River at South Platte, Colo., for 1912—Continued.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
11.....		80	80	285	305	520	378	190	260
12.....		60	80	285	270	480	378	140	230
13.....		50	80	285	270	440	378	118	175
14.....		45	80	235	340	440	310	118	125
15.....		45	90	235	485	560	250	118	100
16.....		45	120	235	780	525	250	220	100
17.....		40	135	515	780	410	250	190	100
18.....		40	135	845	780	485	62	140	100
19.....		45	155	1,120	690	450	310	140	100
20.....		45	175	1,120	690	410	310	140	100
21.....		40	155	980	820	410	310	140	100
22.....	40	40	135	760	600	410	310	118	100
23.....	40	45	135	760	780	375	250	118	100
24.....	40	45	135	715	690	340	220	135	100
25.....	40	45	135	850	905	305	220	135	100
26.....	40	45	135	915	905	305	220	135	80
27.....	40	50	120	960	1,130	450	220	135	80
28.....	40	50	120	1,150	940	410	220	135	80
29.....	40	50	120	1,100	1,130	410	190	135	100
30.....	40	60	135	1,250	1,130	305	118	135	100
31.....	40		135		1,180	165		135	

NOTE.—Discharge determined by the indirect method for shifting channels. Mean discharge January and February estimated from three discharge measurements and record of open-water flow in later part of March. Mean discharge Mar. 1-21 estimated 40 second-feet.

Monthly discharge of South Fork of South Platte River at South Platte, Colo., for 1912.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accu- racy.
	Maximum.	Minimum.	Mean.		
January.....			a 65	4,000	D.
February.....			a 40	2,300	D.
March.....			a 40	2,460	D.
April.....	100	40	53.0	3,150	C.
May.....	175	45	102	6,270	C.
June.....	1,250	140	651	38,700	C.
July.....	1,400	270	760	46,700	C.
August.....	1,280	165	550	33,800	C.
September.....	488	62	287	17,100	C.
October.....	220	118	153	9,410	C.
November.....	440	80	170	10,100	C.
The period.....				174,000	

a Estimated.

SOUTH PLATTE RIVER AT SOUTH PLATTE, COLO.

Location.—In sec. 25, T. 7 S., R. 70 W., in the Pike National Forest, at South Platte, about 300 feet below junction of the North and South forks; no tributary between the forks and the station and none for several miles below.

Records available.—March 28, 1902, to November 30, 1912. Records at Platte Canyon and at Deansbury, a few miles below, extend back to 1887, with the exception of the years 1893 and 1894. The earlier records, 1887-1892, were taken by the State engineer and the records from 1895 to 1898 were taken under the direction of the Denver Power & Irrigation Co.

Drainage area.—2,610 square miles. (Measured from Hayden's Atlas.)

Gage.—An automatic recording gage installed by the State engineer on March 14, 1910. From March 28, 1902, to May 7, 1905, the gage was at the highway bridge. On the latter date it was moved to its present site 150 feet below. It is probable that the new gage read to a somewhat different datum. The recording gage is referred to the datum of the gage established in 1905.

Channel.—Shifting.

Discharge measurements.—Made from car and cable during high water and by wading at low stages.

Winter flow.—Ice causes backwater during a portion of the winter months and measurements are made to determine the flow.

Artificial control.—The flow is controlled to a certain extent by the Cheesman reservoir, which is on the South Fork about 20 miles above the forks.

Diversions.—No water is diverted between this station and that on the South Fork at South Platte, there are court decrees for diversions of 20 second-feet from the North Fork between this station and that on the North Fork at Cassells.

Accuracy.—Although the channel is shifting, sufficient discharge measurements have been obtained to enable reliable estimates of discharge to be made.

Cooperation.—Station maintained in cooperation with the State engineer.

Discharge measurements of South Platte River at South Platte, Colo., in 1912.

Date.	Hydrographer.	Gage height.	Dis-charge.	Date.	Hydrographer.	Gage height.	Dis-charge.
		<i>Feet.</i>	<i>Sec.-ft.</i>			<i>Feet.</i>	<i>Sec.-ft.</i>
Jan. 4a	G. H. Russell.....	3.92	129	July 2	Follansbee & Gray.....	5.40	2,020
29ado.....	1.60	63.5	Aug. 7	Robert Follansbee.....	3.81	944
Feb. 27ado.....	2.50	80.3	Sept. 14	R. H. Fletcher.....	2.70	402
Apr. 29	G. A. Gray.....	1.75	134	Oct. 23b	R. Richards.....	2.12	239
June 1do.....	3.45	811	Nov. 15	Fletcher & Grieve.....	2.10	177

a Relation of gage height to discharge affected by ice at control.

b This measurement is the sum of the South Fork of South Platte River and the North Fork of South Platte River above the forks.

Daily gage height, in feet, of South Platte River at South Platte, Colo., for 1912.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1.....		1.45	2.00	3.45	5.40	5.30	2.25	2.30	2.10
2.....		1.40	2.05	3.40	5.30	5.10	2.15	2.40	2.10
3.....		1.50	2.15	3.80	4.90	4.75	2.45	2.40	2.10
4.....		1.65	2.05	4.10	4.55	4.30	3.05	2.35	2.10
5.....		1.75	1.95	4.10	4.25	4.15	3.00	2.30	2.10
6.....		1.80	1.85	4.05	4.20	3.90	2.90	2.15	2.50
7.....		1.70	1.95	4.05	4.00	3.80	2.90	2.20	2.60
8.....		1.70	2.00	4.50	3.85	3.65	2.80	2.25	2.70
9.....		1.70	2.05	4.65	3.70	3.50	2.80	2.30	2.80
10.....		1.75	2.25	4.80	3.55	3.40	2.85	2.50	2.70
11.....		1.70	2.20	4.70	3.40	3.25	2.80	2.45	2.50
12.....		1.70	2.20	3.45	3.40	3.10	2.90	2.30	2.40
13.....		1.65	2.10	3.60	3.40	3.00	2.90	2.20	2.20
14.....		1.55	2.05	3.35	3.50	3.05	2.70	2.10	2.10
15.....		1.55	2.30	3.35	4.00	3.25	2.60	2.05	2.10
16.....		1.60	2.50	3.30	4.20	3.35	2.55	2.20	2.10
17.....		1.55	2.70	3.70	4.20	3.30	2.55	2.20	2.05
18.....	2.00	1.55	3.00	4.80	4.15	3.20	2.25	2.15	1.95
19.....	2.00	1.60	3.15	5.05	4.00	3.00	2.60	2.15	1.90
20.....	1.70	1.65	3.10	5.05	4.05	2.95	2.65	2.15	1.90
21.....	1.50	1.50	3.15	4.75	4.15	2.95	2.75	2.05	1.90
22.....	1.50	1.50	3.30	4.75	3.95	2.90	2.70	2.00	1.90
23.....	1.45	1.55	3.35	4.50	4.15	2.85	2.55	2.10	1.90
24.....	1.40	1.55	3.35	4.60	4.05	2.75	2.45	2.00	1.90
25.....	1.45	1.60	3.40	4.85	4.45	2.75	2.45	2.00	1.70
26.....	1.50	1.65	3.55	4.70	4.75	2.70	2.40	2.05	1.75
27.....	1.45	1.70	3.45	4.90	4.80	2.85	2.50	2.10	1.80
28.....	1.45	1.70	3.25	4.95	4.80	2.80	2.45	2.10	1.75
29.....	1.50	1.75	3.30	5.10	4.65	2.80	2.40	2.10	1.80
30.....	1.55	1.80	3.60	5.40	5.10	2.55	2.20	2.10	1.80
31.....	1.45		3.80		5.15	2.50		2.10	

NOTE.—Relation of gage height to discharge Mar. 18-20 and Nov. 6-14 affected by ice.

Daily discharge, in second-feet, of South Platte River at South Platte, Colo., for 1912.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1.....		60	190	772	2,020	1,950	265	280	200
2.....		50	205	745	1,950	1,810	235	310	200
3.....		70	235	965	1,670	1,560	328	310	200
4.....		102	205	1,140	1,430	1,270	568	295	200
5.....		128	178	1,140	1,240	1,170	545	280	200
6.....		140	152	1,110	1,200	1,020	500	235	320
7.....		115	178	1,110	1,080	965	500	250	510
8.....		115	190	1,400	992	882	460	265	565
9.....		115	205	1,500	910	800	460	280	565
10.....		128	265	1,600	828	745	480	345	475
11.....		115	250	1,530	745	665	460	328	355
12.....		115	250	772	745	590	500	280	310
13.....		102	220	855	745	545	500	250	250
14.....		80	205	718	800	568	420	220	195
15.....		80	280	718	1,080	665	380	205	180
16.....		90	345	690	1,200	718	362	250	180
17.....		80	420	910	1,200	690	362	250	168
18.....		80	545	1,270	1,170	640	265	235	142
19.....		90	615	1,780	1,080	545	380	235	130
20.....		102	590	1,780	1,110	522	400	235	130
21.....	70	70	615	1,560	1,170	522	440	205	130
22.....	70	70	690	1,560	1,050	500	420	190	130
23.....	60	80	718	1,400	1,170	480	362	220	130
24.....	50	80	718	1,460	1,110	440	328	190	130
25.....	60	90	745	1,640	1,370	440	328	190	80
26.....	70	102	828	1,530	1,560	420	310	205	80
27.....	60	115	772	1,670	1,600	480	345	220	105
28.....	60	115	665	1,700	1,460	460	328	220	92
29.....	70	128	690	1,810	1,500	460	310	220	105
30.....	80	140	855	2,020	1,810	362	250	220	105
31.....	60		965		1,840	345		220	

NOTE.—Discharge Mar. 21 to Oct. 31 determined from a well-defined rating curve; Nov. 1-30 by indirect method for shifting channels. Discharge Nov. 6-14 interpolated by comparison. Mean discharge January, February, and March estimated on basis of three discharge measurements and open water flow of latter part of March.

Monthly discharge of South Platte River at South Platte, Colo., for 1912.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accu- racy.
	Maximum.	Minimum.	Mean.		
January.....			a 95	5,840	D.
February.....			a 75	4,310	D.
March.....			a 75	4,610	D.
April.....	140	50	98.2	5,840	B.
May.....	965	152	451	27,700	B.
June.....	2,020	690	1,300	77,400	B.
July.....	2,020	745	1,250	76,900	B.
August.....	1,950	345	749	46,100	B.
September.....	568	235	393	23,400	B.
October.....	345	190	246	15,100	B.
November.....	565	80	219	13,000	C.
The period.....				300,000	

a Estimated.

SOUTH PLATTE RIVER AT DENVER, COLO.

Location.—At the Sixteenth Street viaduct in Denver, 500 feet below mouth of Cherry Creek.

Records available.—May 7, 1895, to November 30, 1912.

Drainage area.—3,840 square miles.

Gage.—Automatic recording gage installed August 12, 1909. The original gage was located at the Twenty-third Street viaduct. In July, 1895, a new gage was installed at the Fifteenth Street Bridge. In August, 1898, an inclined staff gage was placed on the opposite side of the river, but referred to the same datum. This gage was destroyed by high water in June, 1900, and for the remainder of the year the gage installed in July, 1895, was used. This gage was stolen and a new one placed between the Fifteenth and Sixteenth Avenue bridges May 15, 1901, reading to the same datum. This gage also was stolen and was replaced on June 10, 1903, by a vertical staff near the same place and having the same datum. The automatic gage is referred to practically the same datum as the preceding vertical staff.

Channel.—Shifting.—The dam of the Farmers and Gardeners ditch, located below the station, was washed out July 18, 1912, which materially changed the channel.

Discharge measurements.—Made from the Fifteenth Street Bridge during high water and by wading at low-water stages.

Winter flow.—The flow at this point is seldom affected by ice.

Diversions.—Between this station and the one at South Platte there are court decrees for diversions from South Platte River of 2,226 second-feet and from intervening tributaries of 1,466 second-feet.

Cooperation.—Since 1907 station has been maintained by the State engineer, by whom the records are furnished.

Discharge measurements of South Platte River at Denver, Colo., in 1912.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		<i>Feet.</i>	<i>Sec.-ft.</i>			<i>Feet.</i>	<i>Sec.-ft.</i>
Jan. 8	Grieve and Bunger.....	0.70	67	Aug. 2	Grieve and Hezmalhalch.....	1.22	2,940
Feb. 7	C. E. Turner.....	.90	99	5	M. E. Bunger.....	— .20	1,100
Mar. 18	Chatfield and Bunger.....	1.05	111	9	Hezmalhalch and Bundy.....	— .92	584
Apr. 8	Thos. Grieve.....	1.10	163	16	Turner and Hezmalhalch.....	— .76	666
May 6	C. C. Hezmalhalch.....	.60	44	22	Turner and Bunger.....	—1.40	452
15	M. E. Bunger.....	2.08	561	Sept. 9	M. E. Bunger.....	—2.25	165
20	Grieve and Bunger.....	2.48	976	26	Grieve and Hezmalhalch.....	—1.85	313
29	Grieve and Bundy.....	1.17	208	Oct. 14	M. E. Bunger.....	—2.01	212
June 10	Grieve and Bunger.....	2.46	988	Nov. 6	Bunger and Hezmalhalch.....	—1.79	321
July 1do.....	2.95	1,890				
8do.....	1.32	536				
15	Turner and Bundy.....	2.88	1,920				
26	Grieve and Turner.....	1.25	1,630				
30	Turner and Hezmalhalch.....	.55	1,640				

Daily gage height, in feet, of South Platte River at Denver, Colo., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1.....	0.80	0.60	0.60	0.80	0.50	1.80	2.90	0.85	-1.55	-1.95	-2.10
2.....	.80	.75	.70	.75	.55	1.45	2.70	1.15	-1.85	-2.05	-2.10
3.....	.70	.70	.80	.75	.60	1.40	2.40	.60	-1.95	-2.10	-2.05
4.....	.70	.50	.75	.95	.75	1.80	2.05	.25	-2.10	-2.00	-1.95
5.....	.80	.70	.75	1.00	.70	1.90	1.80	-.20	-2.25	-2.20	-2.20
6.....	.80	.80	.75	1.15	.55	2.00	1.50	-.50	-2.20	-2.10	-2.10
7.....	.70	.90	.80	.95	.55	1.90	1.40	-.50	-2.10	-2.15	-1.85
8.....	.70	.75	.80	.95	.55	2.10	1.35	-.70	-2.05	-2.25	-1.80
9.....	.70	.70	.70	.85	.50	2.65	1.05	-.75	-2.10	-2.30	-1.70
10.....	.75	.70	.75	.70	1.05	2.65	.85	-1.00	-1.90	-2.35	-1.70
11.....	.85	.60	.80	.70	1.25	2.70	.75	-1.10	-1.85	-1.90	-1.50
12.....	.80	.70	.80	.70	1.15	2.05	.70	-1.15	-1.80	-1.70	-1.85
13.....	.90	.70	.75	.70	1.50	1.35	.65	-1.15	-1.80	-1.95	-1.50
14.....	.80	.70	.70	.70	1.85	1.20	2.50	-1.15	-1.95	-2.00	-1.55
15.....	.70	.75	.70	.65	2.05	1.45	2.90	-1.00	-1.70	-2.00	-1.60
16.....	.70	.75	.95	.65	2.00	1.15	1.95	-.75	-1.35	-2.05	-1.70
17.....	.70	.75	1.05	.75	2.15	1.90	1.70	-.70	-1.40	-2.10	-1.60
18.....	.65	.75	1.10	.80	2.30	2.40	1.35	-.80	-1.55	-2.10	-1.80
19.....	.75	.70	1.35	.85	2.45	2.50	.95	-.95	-1.90	-2.15	-2.20
20.....	.75	.65	1.55	.90	2.50	2.85	.65	-1.15	-2.00	-2.15	-2.15
21.....	.70	.65	1.15	.80	2.30	2.80	.55	-1.30	-1.75	-1.90	-2.20
22.....	.70	.70	.95	.80	2.20	2.55	.55	-1.40	-1.80	-1.90	-2.10
23.....	.65	.75	.95	.80	2.05	2.35	.55	-1.60	-1.85	-1.85	-2.25
24.....	.65	.85	.85	.65	1.85	2.15	.70	-1.80	-2.00	-1.90	-2.20
25.....	.70	.65	.85	.65	1.90	2.20	.80	-1.70	-2.00	-1.85	-2.20
26.....	.70	.70	.90	.70	1.75	2.20	1.25	-1.50	-2.00	-1.85	-2.20
27.....	.70	.75	.90	.60	1.70	2.20	1.10	-1.70	-2.00	-1.85	-2.20
28.....	.65	.80	.80	.55	1.50	2.30	.65	-1.70	-2.00	-2.15	-2.20
29.....	.75	.60	.90	.50	1.25	2.40	.40	-1.65	-2.15	-2.25	-2.20
30.....	.7090	.50	1.35	2.60	.55	-1.75	-1.90	-2.25	-2.20
31.....	.7080	1.9060	-1.35	-2.25

Daily discharge, in second-feet, of South Platte River at Denver, Colo., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1.....	80	50	50	75	40	495	1,840	2,290	388	255	05
2.....	80	72	60	65	45	318	1,640	2,845	288	222	205
3.....	65	65	70	65	50	295	1,350	2,070	255	205	222
4.....	65	40	65	118	75	495	1,042	1,605	205	240	255
5.....	80	65	65	130	65	555	845	1,090	158	175	175
6.....	80	80	65	168	45	615	640	825	175	205	205
7.....	65	100	70	118	45	555	580	825	205	190	288
8.....	65	72	70	118	45	685	550	695	222	158	305
9.....	65	60	60	95	40	1,110	395	670	205	140	340
10.....	72	60	65	65	142	1,110	318	570	270	122	340
11.....	90	50	70	65	195	1,150	285	540	288	270	405
12.....	80	60	70	65	168	650	270	522	305	340	440
13.....	100	60	65	65	280	275	255	522	305	255	405
14.....	80	60	60	65	435	220	1,445	522	255	240	388
15.....	65	65	60	58	532	318	1,920	570	340	240	370
16.....	65	65	95	58	540	205	1,000	670	455	222	340
17.....	65	65	115	75	670	555	890	695	440	205	370
18.....	58	65	125	85	800	950	725	645	388	205	305
19.....	72	60	190	95	930	1,090	600	588	270	190	175
20.....	72	55	260	105	990	1,460	550	522	240	190	190
21.....	65	55	140	85	830	1,460	550	470	322	270	175
22.....	65	60	90	85	755	1,265	600	440	305	270	205
23.....	58	65	90	85	650	1,130	650	370	288	288	158
24.....	58	80	80	58	525	990	810	305	240	270	175
25.....	65	55	80	58	555	1,055	1,000	340	240	288	175
26.....	65	60	90	65	468	1,080	1,630	405	240	288	175
27.....	65	65	90	50	440	1,100	1,680	340	240	288	175
28.....	58	70	70	45	340	1,210	1,325	340	240	190	175
29.....	72	50	95	40	238	1,790	1,250	355	190	158	175
30.....	65	95	40	275	2,030	1,645	322	270	158	175
31.....	65	75	555	1,835	455	158

Monthly discharge of South Platte River at Denver, Colo., for 1912.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
January.....	100	58	69.8	4,290
February.....	100	40	63.1	3,630
March.....	260	50	88.5	5,440
April.....	168	40	78.8	4,690
May.....	990	40	379	23,300
June.....	2,080	205	874	52,000
July.....	1,920	255	871	59,700
August.....	2,840	305	756	46,500
September.....	455	158	274	16,300
October.....	340	122	222	15,600
November.....	440	158	256	15,200
Total period.....				245,000

NOTE.—The above records have been changed slightly from the records of the State engineer to conform with the computing rules of the United States Geological Survey.

SOUTH PLATTE RIVER NEAR KERSEY, COLO.

Location.—At highway bridge in sec. 9, T. 5 N., R. 64 W., $1\frac{1}{2}$ miles north of Kersey, 2 miles below the entrance of Lone Tree Creek, an intermittent stream, and 3 miles below the mouth of Cache la Poudre River.

Records available.—April 27, 1901, to October 31, 1903; March 1, 1905, to December 31, 1912.

Drainage area.—9,500 square miles.

Gage.—A chain gage placed in the fall of 1906 in each of the two channels in which the river flows. These gages were referred to a datum slightly different from that of the original gage, but have remained permanent since. The original gage, a vertical staff, was used until June 14, 1906, when the observer moved it 20 feet south. This gage was placed 0.30 foot too high and all readings were corrected by that amount until the chain gages were placed in position.

Channel.—Shifting.

Discharge measurements.—Made from the bridge during high water and by wading at ordinary stages.

Winter flow.—Ice causes slight backwater for a few days during the winter.

Diversions.—Between this station and Denver there are court decrees for diversions of 3,764 second-feet from the South Platte and 17,000 second-feet from intervening tributaries, besides numerous floodwater decrees.

Accuracy.—Although the channel is shifting, sufficient discharge measurements have been obtained to enable estimates of flow to be made which may be regarded as reliable.

Cooperation.—Station maintained in cooperation with the State engineer.

Discharge measurements of South Platte River near Kersey, Colo., in 1912.

Date.	Hydrographer.	Gage height. ^a	Dis-charge.	Gage height. ^b	Dis-charge.
		<i>Feet.</i>	<i>Sec.-ft.</i>	<i>Feet.</i>	<i>Sec.-ft.</i>
Jan. 17	G. H. Russell c.....	2.92	175	3.02	257
Feb. 13	do.....	2.80	139	2.78	233
Mar. 6	do.....	2.72	127	2.73	209
Mar. 28	M. E. Bunger.....	3.20	226	3.20	358
May 8	do.....	2.20	58	2.20	111
May 21	Robert Follansbee.....	3.80	400	3.71	621
June 26	H. B. Waha.....	5.35	1,140	5.31	2,440
Aug. 17	Robert Follansbee.....	2.50	79.8	2.50	114
Aug. 27	Raymond Richards.....	2.40	71.7	2.14	51.6
Oct. 30	do.....	3.19	258	3.20	335
Nov. 20	M. E. Bunger.....	3.56	401	3.56	541

^a Gage in channel No. 1.

^b Gage in channel No. 2.

^c Relation of gage height to discharge probably affected by ice in stream.

Daily gage height, in feet, of channels Nos. 1 and 2 of South Platte River near Kersey, Colo., for 1912.

[Mrs. J. C. Maisner, observer.]

Channel No. 1.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1.	3.2	2.8	2.55	2.98	2.65	2.25	5.5	5.4	2.45	3.4	3.2	3.5
2.	3.2	2.8	2.6	2.95	2.58	2.55	5.8	5.6	2.42	3.4	3.2	3.5
3.	3.3	2.75	2.72	2.88	2.5	2.32	5.6	5.6	2.4	3.3	3.2	3.5
4.	3.3	2.8	2.75	2.82	2.52	2.15	5.3	5.4	2.42	3.25	3.2	3.5
5.	3.3	2.75	2.75	2.8	2.52	2.2	5.6	5.1	2.42	3.2	3.2	3.55
6.	3.4	2.72	2.75	2.78	2.45	2.25	5.4	5.6	2.42	3.1	3.2	3.5
7.	3.35	2.72	2.72	2.72	2.32	2.48	4.8	4.2	2.42	3.3	3.2	3.4
8.	3.3	2.75	2.78	2.68	2.22	2.85	4.8	3.9	2.42	3.25	3.15	3.45
9.	3.3	2.75	2.72	2.68	2.18	3.4	4.6	3.6	2.45	3.25	3.1	3.5
10.	3.0	2.75	2.7	2.7	2.25	4.2	4.4	3.4	2.5	3.05	3.1	3.5
11.	2.88	2.78	2.78	2.65	2.52	4.5	4.0	3.4	2.75	3.1	3.3	3.5
12.	2.98	2.82	2.78	2.6	2.85	4.3	3.7	3.0	2.88	3.1	3.3	3.5
13.	2.8	2.8	2.75	2.68	3.3	3.8	3.2	2.7	2.95	3.15	3.4	3.55
14.	2.72	2.78	2.72	2.58	3.55	3.3	3.2	2.5	3.35	3.2	3.4	3.6
15.	2.85	2.8	2.7	2.55	3.85	2.92	4.0	2.38	3.55	3.2	3.4	3.7
16.	2.85	2.8	2.72	2.5	4.4	3.0	5.6	2.38	3.8	3.2	3.4	3.6
17.	2.92	2.82	2.78	2.5	4.6	3.3	5.8	2.5	3.8	3.2	3.4	3.5
18.	2.95	2.8	2.8	2.6	4.4	4.3	5.0	2.58	3.8	3.2	3.5	3.4
19.	2.92	2.8	2.88	2.68	4.0	4.8	4.8	3.05	3.7	3.15	3.5	3.3
20.	2.8	2.75	3.2	2.8	3.9	4.2	4.7	2.85	3.7	3.15	3.6	3.3
21.	2.75	2.8	3.5	2.8	3.8	4.2	4.6	2.72	3.55	3.2	3.6	3.2
22.	2.7	2.78	3.3	2.8	3.45	4.2	4.6	2.58	3.5	3.2	3.8	3.2
23.	2.75	2.75	3.2	2.92	3.3	4.3	4.8	2.45	3.45	3.25	3.8	3.2
24.	2.8	2.8	3.2	2.92	3.1	4.5	4.6	2.42	3.4	3.2	3.8	3.2
25.	2.85	2.8	3.2	2.9	2.9	4.9	4.6	2.4	3.35	3.2	3.7	3.3
26.	2.88	2.8	3.2	2.9	2.65	5.2	4.2	2.4	3.35	3.2	3.6	3.3
27.	2.9	2.72	3.2	2.9	2.48	5.2	4.5	2.4	3.35	3.2	3.5	3.2
28.	2.85	2.8	3.2	2.85	2.42	5.4	4.9	2.42	3.3	3.2	3.5	3.2
29.	2.85	2.75	3.1	2.85	2.25	5.4	4.8	2.4	3.3	3.15	3.5	3.3
30.	2.8	-----	3.1	2.72	2.18	5.2	4.6	2.4	3.3	3.2	3.5	3.3
31.	2.8	-----	3.3	-----	2.12	-----	5.0	2.42	-----	3.2	-----	3.3

Channel No. 2.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1.	3.65	2.7	2.5	2.9	2.51	2.28	5.5	5.3	2.2	3.32	3.2	3.65
2.	3.6	2.7	2.48	2.83	2.46	2.66	5.8	5.4	2.22	3.3	3.25	3.65
3.	3.6	2.7	2.6	2.76	2.38	2.36	5.6	5.5	2.2	3.28	3.22	3.6
4.	3.6	2.72	2.6	2.73	2.48	2.11	5.5	5.3	2.22	3.25	3.25	3.65
5.	3.6	2.65	2.66	2.68	2.48	2.21	5.5	5.3	2.22	3.18	3.2	3.65
6.	3.6	2.68	2.68	2.66	2.41	2.26	5.3	4.6	2.22	3.15	3.2	3.5
7.	3.6	2.75	2.68	2.58	2.24	3.04	4.7	4.1	2.22	3.1	3.2	3.5
8.	3.6	2.8	2.7	2.56	2.14	2.94	4.7	3.9	2.22	3.1	3.15	3.5
9.	3.6	2.8	2.6	2.58	2.28	3.48	4.6	3.7	2.28	3.1	3.15	3.6
10.	3.2	2.76	2.66	2.6	2.26	4.3	4.25	3.48	2.45	3.15	3.1	3.6
11.	2.58	2.78	2.73	2.53	2.56	4.5	4.05	3.33	2.72	3.2	3.12	3.65
12.	2.72	2.78	2.68	2.48	3.18	4.0	3.36	3.1	2.8	3.2	3.35	3.65
13.	2.65	2.78	2.68	2.56	3.21	3.8	3.01	2.8	2.82	3.22	3.48	3.7
14.	2.68	2.8	2.66	2.46	3.65	3.24	2.99	2.6	3.2	3.25	3.4	3.7
15.	2.85	2.8	2.58	2.46	3.9	2.88	3.99	2.48	3.38	3.25	3.42	3.75
16.	2.95	2.8	2.63	2.43	4.4	3.06	5.6	2.48	3.7	3.25	3.4	3.7
17.	3.0	2.8	2.73	2.4	4.6	3.36	5.7	2.5	3.6	3.25	3.4	3.65
18.	2.98	2.78	2.78	2.6	4.25	4.4	4.9	2.53	3.6	3.25	3.5	3.6
19.	2.92	2.8	2.9	2.68	3.95	4.9	4.7	2.23	3.55	3.2	3.5	3.5
20.	2.8	2.7	2.23	2.83	3.9	4.2	4.6	2.78	3.5	3.2	3.6	3.5
21.	2.58	2.72	3.6	2.83	3.7	4.15	4.5	2.6	3.48	3.25	3.6	3.45
22.	2.58	2.7	3.33	2.8	3.45	4.2	4.5	2.43	3.45	3.28	3.7	3.55
23.	2.7	2.72	3.23	2.9	3.36	4.2	4.7	2.33	3.42	3.3	3.7	3.55
24.	2.75	2.75	3.18	2.9	3.18	4.5	4.45	2.26	3.35	3.25	3.75	3.88
25.	2.9	2.78	3.13	2.86	2.91	4.9	4.4	2.13	3.4	3.25	3.7	3.88

Daily gage height, in feet, of channels Nos. 1 and 2 of South Platte River near Kersey, Colo., for 1912—Continued.

Channel No. 2—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
26.....	2.95	2.72	3.16	2.86	2.66	5.2	4.25	2.18	3.45	3.2	3.6	3.33
27.....	2.95	2.65	3.18	2.83	2.51	5.2	4.35	2.16	3.45	3.2	3.6	3.28
28.....	2.88	2.7	3.2	2.78	2.36	5.4	4.9	2.32	3.4	3.2	3.6	3.3
29.....	2.8	2.62	3.13	2.78	2.38	5.3	4.7	2.1	3.4	3.15	3.6	3.32
30.....	2.82	3.13	2.63	2.11	5.1	4.35	2.12	3.38	3.22	3.65	3.33
31.....	2.72	3.28	2.08	4.8	2.2	3.25	3.38

NOTE.—Relation of gage height to discharge (Channel No. 1) Jan. 1-10 and Mar. 20-22 and (Channel No. 2) Jan. 1-20 and Mar. 20-22 affected by ice.

Daily discharge, in second-feet, of channels Nos. 1 and 2 of South Platte River near Kersey, Colo., for 1912.

Channel No. 1.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1.....	140	98	176	112	60	1,220	1,160	75	335	265	370
2.....	140	105	170	102	98	1,380	1,280	72	335	265	370
3.....	130	124	156	90	67	1,280	1,280	70	300	265	370
4.....	140	130	144	93	50	1,220	1,160	72	282	265	370
5.....	130	130	140	93	55	1,280	1,000	72	265	265	390
6.....	124	130	136	82	60	1,160	1,280	72	230	265	370
7.....	124	124	124	67	87	850	565	72	300	265	335
8.....	130	136	117	57	150	850	445	72	282	248	352
9.....	130	124	117	53	280	750	340	75	282	230	370
10.....	130	120	120	60	565	655	280	80	215	230	370
11.....	156	136	136	112	93	700	485	280	128	230	300	370
12.....	176	144	136	105	150	610	375	170	164	230	300	370
13.....	140	140	130	117	255	410	220	110	185	248	335	390
14.....	124	136	124	102	325	255	220	80	318	265	335	410
15.....	150	140	120	98	428	164	485	62	390	265	335	450
16.....	150	140	124	90	655	180	1,280	62	490	265	335	410
17.....	164	144	136	90	750	255	1,380	80	490	265	335	370
18.....	170	140	140	105	655	610	950	92	490	265	370	335
19.....	164	140	156	117	485	850	850	215	450	248	370	300
20.....	140	130	174	140	445	565	800	155	450	248	410	300
21.....	130	140	193	140	410	565	750	120	390	265	410	265
22.....	120	136	212	140	295	565	750	92	370	265	490	265
23.....	130	130	230	164	255	610	850	75	352	282	490	265
24.....	140	140	230	164	205	700	750	72	335	265	490	265
25.....	150	140	230	160	160	900	750	70	318	265	450	300
26.....	156	140	230	160	112	1,060	565	70	318	265	410	300
27.....	160	124	230	160	87	1,060	700	70	318	265	370	265
28.....	150	140	230	150	78	1,160	900	72	300	265	370	265
29.....	150	130	205	150	60	1,160	850	70	300	248	370	300
30.....	140	205	124	53	1,060	750	70	300	265	370	300
31.....	140	255	47	950	72	265	300

Channel No. 2.

1.....	205	160	260	162	122	2,680	2,420	60	391	335	595
2.....	205	156	239	152	195	3,050	2,550	63	380	358	595
3.....	205	180	220	137	134	2,800	2,680	60	371	344	560
4.....	210	180	212	156	96	2,680	2,420	63	358	358	595
5.....	192	195	200	156	112	2,680	2,420	63	326	335	595
6.....	200	200	195	142	119	2,420	1,550	63	315	335	495
7.....	218	200	176	116	304	1,680	960	63	295	335	495
8.....	230	205	172	101	272	1,680	780	63	295	315	495
9.....	230	180	176	122	490	1,550	630	72	295	315	560
10.....	220	195	180	119	1,180	1,120	490	100	315	295	560
11.....	225	212	166	172	1,420	915	396	166	335	303	595
12.....	225	200	156	357	870	428	295	190	335	408	630
13.....	225	200	172	369	700	294	190	196	344	483	595
14.....	230	195	152	595	381	287	135	335	358	435	630
15.....	230	176	152	780	254	861	106	424	358	447	665

Daily discharge, in second-feet, of channels Nos. 1 and 2 of South Platte River near Kersey, Colo., for 1912—Continued.

Channel No. 2—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
16.....		230	188	146	1,300	311	2,800	106	630	358	435	630
17.....	257	230	212	140	1,550	428	2,920	110	560	358	435	595
18.....	236	225	225	180	1,120	1,300	1,920	118	560	358	495	560
19.....	216	230	260	200	825	1,920	1,680	64	528	335	495	495
20.....	196	205	290	239	780	1,060	1,550	184	495	335	560	495
21.....		176	210	319	239	630	1,010	1,420	135	483	358	560
22.....		176	205	348	230	475	1,060	1,420	96	465	371	630
23.....		205	210	377	260	428	1,060	1,680	80	447	380	630
24.....		218	218	357	260	357	1,420	1,360	69	408	358	665
25.....		260	225	337	248	263	1,920	1,300	51	435	358	630
26.....	275	210	349	248	195	2,300	1,120	57	465	335	560	424
27.....	275	192	357	239	162	2,300	1,240	55	465	335	560	371
28.....	254	205	365	225	134	2,550	1,920	78	435	335	560	380
29.....	230	185	337	225	137	2,420	1,680	47	435	315	560	391
30.....	236		337	188	96	2,180	1,240	50	424	344	595	424
31.....	210		397		94		1,800	60		358		424

NOTE.—Channel No. 1: Discharge determined from three fairly well defined rating curves. Discharge Jan. 1-10 estimated at 150 second-feet.

Channel No. 2: Discharge determined from two fairly well defined rating curves. Discharge estimated at 225 second-feet Jan. 1-16. Discharge Jan. 17-20 estimated.

Daily discharge, in second-feet, of South Platte River near Kersey, Colo., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1.....	375	345	258	436	274	182	3,900	3,580	135	726	600	965
2.....	375	345	261	409	254	293	4,430	3,830	135	715	623	965
3.....	375	335	304	376	227	201	4,080	3,960	130	671	609	930
4.....	375	350	310	356	249	146	3,900	3,580	135	640	623	965
5.....	375	322	325	340	249	167	3,960	3,420	135	591	600	985
6.....	375	324	330	331	224	179	3,580	2,830	135	545	600	865
7.....	375	342	324	300	183	391	2,530	1,420	135	595	600	830
8.....	375	360	341	289	158	422	2,530	1,220	135	577	563	847
9.....	375	360	304	293	175	770	2,300	970	147	577	545	930
10.....	375	350	315	306	179	1,740	1,780	770	180	530	525	930
11.....	381	361	348	278	265	2,120	1,400	676	294	565	603	965
12.....	401	369	336	261	507	1,480	803	465	354	565	708	1,000
13.....	365	365	330	289	624	1,110	514	300	381	592	818	985
14.....	349	366	319	254	920	636	507	215	653	623	770	1,040
15.....	375	370	296	250	1,210	418	1,346	168	814	623	782	1,120
16.....	375	370	312	236	1,960	491	4,080	168	1,120	623	770	1,040
17.....	421	374	348	230	2,300	683	4,300	190	1,050	623	770	965
18.....	406	365	365	285	1,780	1,910	2,870	210	1,050	623	865	895
19.....	380	370	416	317	1,310	2,770	2,530	279	978	583	865	795
20.....	336	335	464	379	1,220	1,620	2,350	339	945	583	970	795
21.....	306	350	512	379	1,040	1,580	2,170	255	873	623	970	730
22.....	296	341	560	370	770	1,620	2,170	188	835	636	1,120	673
23.....	335	340	607	424	683	1,670	2,530	155	799	662	1,120	673
24.....	358	358	587	424	562	2,120	2,110	141	743	623	1,160	689
25.....	410	365	567	408	423	2,820	2,060	121	753	623	1,080	724
26.....	431	350	579	408	307	3,360	1,680	127	783	600	970	724
27.....	435	316	587	399	249	3,360	1,940	125	783	600	930	636
28.....	404	345	595	375	212	3,710	2,820	150	735	600	930	645
29.....	380	315	542	375	197	3,580	2,530	117	735	563	930	691
30.....	376		542	312	149	3,240	1,990	120	724	609	965	724
31.....	350		652		141		2,750	132		623		724

Monthly discharge of South Platte River near Kersey, Colo., for 1912.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accu- racy.
	Maximum.	Minimum.	Mean.		
January.....	435	296	375	23,100	C.
February.....	374	315	350	20,100	B.
March.....	652	258	417	25,600	B.
April.....	436	230	336	20,000	B.
May.....	2,300	141	613	37,700	B.
June.....	3,710	146	1,490	88,700	B.
July.....	4,430	507	2,530	156,000	B.
August.....	3,960	117	978	60,100	B.
September.....	1,120	130	560	33,300	B.
October.....	726	530	611	37,600	B.
November.....	1,160	525	799	47,500	B.
December.....	1,120	636	853	52,400	B.
The year.....	4,430	117	826	602,000	

NOTE.—These estimates are the combined flow of the two channels.

SOUTH PLATTE RIVER AT JULESBURG, COLO.

Location.—At highway bridge, about sec. 33, T. 12 N., R. 44 W., 1 mile south of Julesburg. No important tributaries between the station and the Colorado-Nebraska State line, 1 mile distant. All the tributaries for 100 miles or more above the station are intermittent.

Records available.—April 2, 1902, to November 16, 1906; May 12, 1908, to November 30, 1912.

Drainage area.—20,600 square miles.

Gage.—When the station was reestablished in 1908 it was located at the new highway bridge, 2,000 feet upstream from the original station. The datum of the chain gage has remained unchanged since 1908.

Channel.—Extremely shifting at times, requiring frequent measurements.

Discharge measurements.—Made from the pile bridge during high water and by wading at low-water stages.

Winter flow.—Ice causes backwater during the winter months and measurements are made to determine the flow.

Diversions.—Between Kersey and Julesburg there are court decrees for diversions of 5,316 second-feet from the South Platte and diversions of 1,240 second-feet from intervening tributaries, including Lodgepole Creek in Nebraska and Wyoming and Crow Creek in Wyoming. There are also numerous floodwater decrees. Between the State line and the mouth, diversions of 206 second-feet from the South Platte have been granted in Nebraska.

Accuracy.—Although the channel is shifting, sufficient measurements have been made to give fair discharge estimates prior to the high water in August, 1912. After that date the estimates are only approximate.

Cooperation.—During 1912 this station was maintained in cooperation with the State engineer.

Discharge measurements of South Platte River at Julesburg, Colo., in 1912.

Date.	Hydrographer.	Gage height.	Dis-charge.	Date.	Hydrographer.	Gage height.	Dis-charge.
Jan. 15 ^a	G. H. Russell.....	1.75	77.6	July 26	F. Cogswell.....	0.54	14
Feb. 12 ^ado.....	1.95	366	Aug. 3do.....	2.69	798
Mar. 5 ^ado.....	2.20	168	22	Robert Follansbee.....	2.09	326
May 7	M. E. Bunger.....	1.15	73	28	F. Cogswell.....	1.15	193
22	Robert Follansbee.....	1.58	141	Oct. 29	R. Richards.....	1.52	210
June 27	H. B. Waha.....	.52	12.7	Nov. 19	M. E. Bunger.....	1.92	413

^a Relation of gage height to discharge affected by ice in stream.

Daily gage height, in feet, of South Platte River at Julesburg, Colo., for 1912.

[Elva McSparran, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1.....	1.0	2.2	2.5	1.65	0.9	0.4	1.6	0.9	2.4	1.68
2.....	1.0	2.0	2.4	1.6	.9	.4	2.4	.9	2.35
3.....	1.0	2.0	2.2	2.39	.4	2.7	.9	2.2	1.6
4.....	1.0	1.9	2.2	2.259	1.4	3.0	.85	2.3	1.58
5.....	1.0	1.9	2.159	1.05	3.15	.85	2.25	1.6
6.....	1.0	1.9	2.3	2.18	1.5	3.25	.8	2.1	1.6
7.....	.9	1.9	2.3	2.05	1.15	.8	1.5	3.2	.8	2.1	1.6
8.....	.9	1.7	2.3	2.08	1.55	3.05	.85	2.05	1.65
9.....	.9	1.6	2.3	2.08	1.7	3.2	.9	1.9	1.65
10.....	.9	1.6	2.3	2.09	1.8	2.85	1.1	1.98
11.....	.9	1.6	2.3	2.08	1.6	1.4	1.95	1.7
12.....	.9	1.7	2.3	2.0	1.65	.8	1.5	2.8	1.5	1.8	1.75
13.....	.9	1.7	2.3	2.0	1.6	.8	1.3	2.7	1.6	1.8	1.7
14.....	1.6	1.8	2.3	2.0	1.6	.8	1.05	2.7	1.8	1.7	1.7
15.....	1.7	1.8	2.3	2.0	1.6	.9	1.1	2.55	2.0	1.7	1.75
16.....	1.8	2.3	1.95	1.65	.8	.9	2.5	2.0	1.5	1.8
17.....	2.0	1.8	2.4	1.9	1.5	.8	.9	2.4	1.95	1.5	1.9
18.....	2.1	2.0	2.4	1.85	1.5	.85	1.8	2.3	2.22	1.4
19.....	2.2	2.0	2.4	1.8	1.55	.85	1.75	2.15	2.3	1.4	1.95
20.....	2.3	2.0	2.4	1.9	1.5	.95	1.8	2.1	2.2	1.95
21.....	2.3	2.0	2.4	1.9	1.6	.85	1.7	2.4	1.48	1.9
22.....	2.3	2.0	2.9	1.8	1.5	.7	1.65	2.5	1.4	1.9
23.....	2.3	2.0	2.9	1.8	1.4	.65	1.65	1.8	2.4	1.58
24.....	2.4	2.0	3.1	1.85	1.4	.6	1.65	1.75	2.5	1.5	1.9
25.....	2.65	1.9	3.2	1.85	1.3	.7	1.6	1.75	2.5	1.6	1.92
26.....	2.6	1.9	3.15	1.8	1.3	.55	1.65	2.4	1.92
27.....	2.4	1.9	2.95	1.8	1.1	.55	1.65	1.5	2.45	1.6	1.95
28.....	2.4	1.9	2.6	1.8	1.1	.4	1.4	1.3	2.45	1.5	1.95
29.....	2.5	2.6	1.75	1.1	.4	1.3	2.35	1.55	1.95
30.....	2.4	2.7	1.7	1.1	.5	1.1	2.4	1.58	1.95
31.....	2.3	1.19	1.1	1.6

NOTE.—Ice present Jan. 1 to Mar. 31. Gage heights July 18–28 thought to read 1 foot too high; discharges applied after reducing gage heights this amount.

Daily discharge, in second-feet, of South Platte River at Julesburg, Colo., for 1912.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1.....	635	158	43	7	145	130	940	281
2.....	550	145	43	7	550	130	900	263
3.....	470	130	43	7	815	130	770	245
4.....	435	115	43	108	1,080	120	855	237
5.....	370	100	43	60	1,220	115	810	245
6.....	340	85	34	125	1,310	105	685	245
7.....	315	72	34	125	1,260	105	640	245
8.....	290	90	34	135	1,130	115	600	268
9.....	290	110	34	170	1,260	125	480	268
10.....	230	130	43	200	950	170	540	279
11.....	290	149	34	145	928	280	515	290
12.....	290	158	34	125	905	335	410	318
13.....	290	145	34	98	815	365	410	290
14.....	290	145	34	60	815	505	350	290
15.....	250	145	43	66	680	675	320	318
16.....	265	158	34	43	635	675	225	345
17.....	240	125	34	43	550	630	225	405
18.....	220	125	38	34	470	885	190	422
19.....	200	135	38	30	370	965	190	438
20.....	240	125	48	34	340	865	202	438
21.....	210	145	38	26	332	1,000	215	405
22.....	200	125	26	22	325	1,100	190	405
23.....	200	108	22	22	240	1,000	237	405
24.....	220	108	18	22	265	1,100	205	405
25.....	220	93	26	18	315	1,100	245	418
26.....	200	93	14	22	305	1,000	245	418
27.....	200	66	14	22	295	1,050	245	438
28.....	200	66	7	7	250	1,050	205	438
29.....	185	66	7	19	250	900	225	438
30.....	170	66	11	31	180	940	237	438
31.....	66	43	180	245

NOTE.—Discharge determined as follows: Apr. 1 to Aug. 20 from a poorly defined curve; Aug. 21 to Oct. 22, by the indirect method for shifting channels; Oct. 23 to Nov. 30 from a curve determined by two measurements and drawn parallel to curve of Apr. 1 to Aug. 20. Discharge interpolated for days for which gage heights are missing.

Monthly discharge of South Platte River at Julesburg, Colo., for 1912.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accu- racy.
	Maximum.	Minimum.	Mean.		
April.....	635	170	288	17,100	C.
May.....	158	66	114	7,010	C.
June.....	48	7	31.6	1,880	C.
July.....	200	7	60.4	3,710	C.
August.....	1,310	145	618	38,000	C.
September.....	1,100	105	589	35,000	D.
October.....	940	190	411	25,300	D.
November.....	438	245	345	20,500	C.
The period.....				148,000	

TARRYALL CREEK NEAR COMO, COLO.

Location.—At highway bridge in sec. 26, T. 8 S., R. 76 W., $1\frac{1}{2}$ miles northeast of Como. No tributary within several miles of the station.

Records available.—July 21, 1911, to July 8, 1912.

Drainage area.—Not measured.

Gage.—Vertical staff.

Channel.—Data too meager to determine.

Discharge measurements.—Made from bridge during high water and by wading during low water.

Winter flow.—Ice causes backwater during the winter months and the records are discontinued.

Diversions.—There are court decrees for diversions of 255 second-feet from Tarryall Creek above the station.

Accuracy.—Data insufficient for estimates of discharge.

Cooperation.—Station maintained in cooperation with the United States Forest Service.

NOTE.—On Apr. 5 H. B. Waha found the stream dry and frozen to bottom. The following gage heights were recorded: May 9, 1.8; May 19, 1.9; May 28, 1.2; June 2, 1.2; June 9, 1.9; June 18, 1.3; June 29, 1.5; and July 8, 1.0 foot.

TARRYALL CREEK NEAR JEFFERSON, COLO.

Location.—At Robbins ranch, in sec. 6, T. 9 S., R. 74 W., about 10 miles southeast of Jefferson. Rock Creek enters half a mile below.

Records available.—June 27 to December 31, 1912. From October 18, 1910, to June 28, 1911, a station was maintained within a quarter of a mile of this point, but the relation between the two gages is not known.

Drainage area.—Not measured.

Gage.—Vertical staff.

Channel.—Data too meager to determine.

Discharge measurements.—Made by wading.

Winter flow.—Ice causes backwater during the winter months and the records are discontinued.

Diversions.—There are court decrees for diversions of 314 second-feet from Tarryall Creek above the station and for 926 second-feet from tributaries entering above.

Accuracy.—Results fair.

Cooperation.—Station maintained in cooperation with the Tarryall Canal & Reservoir Co.

Discharge measurements of Tarryall Creek near Jefferson, Colo., in 1912.

Date.	Hydrographer.	Gage height.	Dis-charge.
June 27	Robert Follansbee	<i>Fect.</i> 1.44	<i>Sec.-ft.</i> 213
Aug. 6	do.....	0.70	91.4
Sept. 12	R. H. Fletcher.....	.40	46.8

Daily gage height, in feet, of Tarryall River near Jefferson, Colo., for 1912.

[Rose E. Robbins, observer.]

Day.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Day.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1....		1.96	2.22	0.39	0.32	0.12	0.15	16....		1.98	0.84	0.45	0.26	0.10	0.28
2....		1.45	1.26	.38	.30	.20	.2	17....		1.26	.79	.41	.25	.05	.2
3....		1.15	.86	.41	.30	.20	.2	18....		.89	.69	.50	.21	0	0
4....		1.08	.78	.35	.32	.20	.15	19....		2.73	.58	.42	.20	0	0
5....		1.05	.76	.34	.35	.20	.18	20....		.98	.52	.39	.20	.05
6....		.83	.69	.32	.30	.10	.15	21....		.81	.50	.38	.20	.10	0
7....		.61	.72	.33	.32	.15	.12	22....		1.25	.46	.35	.22	.10
8....		.54	.71	.32	.32	.20	.0	23....		1.51	.42	.35	.18	.15	0
9....		.44	.65	.32	.32	.40	.1	24....		2.80	.49	.38	.18	.15	.02
10....		.41	.62	.35	.32	.38	.12	25....		2.10	.39	.38	.15	.15
11....		.38	.60	.32	.30	.30	.2	26....		1.88	.39	.36	.15	.15	.02
12....		.42	.59	.38	.30	.28	.22	27....	1.48	1.56	.41	.35	.15	.2	0
13....		.44	.58	.36	.26	.28	.5	28....	1.52	1.58	.39	.32	.15	.2
14....		.54	.74	.38	.25	.10	.02	29....	2.18	1.48	.40	.33	.15	.15
15....	1.23	.89	.40	.25	.05	.12	.30....	2.50	2.07	.40	.30	.12	.15
							31....	2.50	.4912

Daily discharge, in second-feet, of Tarryall Creek near Jefferson, Colo., for 1912.

Day.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Day.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1....		308	357	46	38	21	24	16....		311	112	54	32	20	18
2....		216	182	45	36	27	27	17....		182	104	48	32	17	16
3....		164	116	48	36	27	27	18....		120	90	61	28	14	14
4....		152	103	42	38	27	24	19....		460	73	50	27	14	14
5....		146	100	40	42	27	26	20....		135	64	46	27	17	14
6....		111	90	38	36	20	24	21....		108	61	45	27	20	14
7....		78	94	39	38	24	21	22....		180	55	42	29	20	14
8....		67	92	38	38	27	14	23....		227	50	42	26	24	14
9....		53	84	38	38	30	20	24....		475	60	45	26	24	15
10....		48	79	42	38	33	21	25....		334	46	45	24	24	15
11....		45	76	38	36	36	20	26....		293	46	43	24	24	15
12....		50	74	45	36	34	18	27....	221	236	48	42	24	27	14
13....		53	73	43	32	34	16	28....	229	239	46	38	24	27	14
14....		67	97	45	32	20	15	29....	349	221	47	39	24	24	14
15....	177	120	47	32	17	21	21	30....	412	328	47	36	21	24	14
								31....	412	60	21	14

NOTE.—Discharge determined from a well-defined curve, based on seven measurements made during 1912 and 1913.

Monthly discharge of Tarryall Creek near Jefferson, Colo., for 1912.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accu- racy.
	Maximum.	Minimum.	Mean.		
July.....	475	45	193	11,900	B.
August.....	357	46	88.6	5,450	B.
September.....	61	36	43.7	2,600	B.
October.....	42	21	31.0	1,910	B.
November.....	36	14	24.1	1,430	C.
December.....	27	14	16.5	1,010	D.
The period.....				24,300	

TARRYALL CREEK NEAR HAYMAN, COLO.

Location.—At McLaughlin's ranch, in sec. 23, T. 11 S., R. 72 W., 6 miles northeast of Hayman post office, in the Pike National Forest. Nearest tributary is a small stream entering from the north just below.

Records available.—October 23, 1910, to June 30, 1912.

Drainage area.—Not measured.

Gage.—Vertical staff.

Channel.—Apparently permanent.

Discharge measurements.—Made from the bridge during high water and by wading at ordinary stages.

Winter flow.—Ice causes backwater during the winter months.

Diversions.—There are court decrees for diversions of 205 second-feet from Tarryall Creek between this station and the one near Jefferson.

Accuracy.—Owing to the meager gage heights daily discharge is only given for the days when the gage was read. Results are considered fairly reliable.

Cooperation.—Station maintained in cooperation with the United States Forest Service.

The following estimate of discharge was made by H. B. Waha:

January 17, 1912: Estimate, 0.5 second-foot.

*Daily gage height, in feet, and discharge, in second-feet, of Tarryall Creek near Hayman,
Colo., for 1910.*

[F. C. Parrett, observer.]

Day.	October.		November.		December.		Day.	October.		November.		December.	
	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.		Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
1.....							16.....						
2.....							17.....						
3.....							18.....			0.62	13		
4.....							19.....						
5.....			0.72	19			20.....						
6.....					0.82		21.....						
7.....					.72		22.....			.57	12	0.42	5.2
8.....							23.....	0.52	9.0	.52	9.0		
9.....							24.....						
10.....							25.....						
11.....							26.....						
12.....			.62	14			27.....	.52	9.0				
13.....			.62	14			28.....						
14.....							29.....			.72		.32	2.5
15.....					.52	9.0	30.....	.47	7.0				
							31.....						

NOTE.—Gage heights for 1910 are republished as a change of gage datum was made Apr. 26, 1911, all previous gage heights being reduced 0.28 foot.

Daily discharge, in second-feet, of Tarryall Creek near Hayman, Colo., for 1911.

[illegible]

Daily discharge, in second-feet, of Tarryall Creek near Hayman, Colo., for 1911—Contd.

Day.	Jan.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
11	1.6			2.0			28			
12							32		25	
13										
14						65		12	22	
15										19
16										
17						56				
18							25		19	
19								12		
20					31					
21		4.5								
22										
23										
24							32			
25						56				
26			31				28	12	32	
27										
28									32	
29		31				65				
30										
31							22			

NOTE.—Discharge determined from two rating curves as follows: Oct. 23, 1910, to Aug. 2, 1911; Aug. 3, 1911 to June 10, 1912, fairly well defined.

Daily gage height, in feet, and discharge, in second-feet, of Tarryall Creek near Hayman, Colo., for 1912.

[F. C. Parrett, observer.]

Day.	January.		February.		March.		April.		May.		June.	
	Gage height.	Dis-charge.	Gage height.	Dis-charge.	Gage height.	Dis-charge.	Gage height.	Dis-charge.	Gage height.	Dis-charge.	Gage height.	Dis-charge.
1												
2			—0.1									
3												
4												
5							0.8	25				
6												
7												
8											2.8	234
9	—0.3								1.0	39	3.3	294
10			— .2									
11												
12												
13												
14							1.5	84				
15												
16												
17	— .3	0.5										
18												
19	— .2											
20					2.1	151			.85	28		
21												
22					2.1	151						
23									.8	25		
24												
25												
26							1.7	106				
27												
28												
29												
30												
31												

NOTE.—Relation of gage height to discharge affected by ice during January and February.

JEFFERSON CREEK AT JEFFERSON, COLO.

Location.—At highway bridge at Jefferson, in sec. 8, T. 8 S., R. 75 W. Nearest tributary enters $1\frac{1}{2}$ miles below.

Records available.—October 17, 1910, to July 11, 1912.

Drainage area.—Not measured.

Gage.—Vertical staff, which was lowered 0.66 foot. All readings have been referred to the latter datum.

Channel.—Shifting.

Discharge measurements.—Made from the bridge at high water and by wading at ordinary stages.

Winter flow.—Ice causes backwater during the winter months.

Diversions.—There are court decrees for diversions from Jefferson Creek of 167 second-feet above the station and 21 second-feet below. There is a decree of 546 second-feet diversion from Jefferson Lake.

Accuracy.—Data insufficient for estimates of discharge.

Cooperation.—Station maintained in cooperation with the United States Forest Service.

The following estimate of discharge was made by H. B. Waha:

April 5, 1912: Estimate, 2 second-feet.

Daily gage height, in feet, of Jefferson Creek at Jefferson, Colo., for 1912.

[Roy M. Truman, observer.]

Day.	Apr.	May.	June.	July.	Day.	Apr.	May.	June.	July.
1.		0.9		0.8	16.		0.85		
2.		1.0			17.	0.75	.95		
3.		.9	0.6		18.		.8	0.7	
4.					19.				
5.					20.	.7	.9		
6.				.5	21.			.6	
7.				.6	22.		.75		
8.		.8	.7		23.				
9.		.7			24.	.7		.9	
10.		.65	.5		25.	.75	.8	1.0	
11.	0.7			.6	26.				
12.	.7				27.	.75		.9	
13.	.5				28.		.7		
14.		.75			29.	1.0		.8	
15.	.7		.7		30.	1.4	.6		
					31.				

NOTE.—Gage heights affected by ice during April.

MICHIGAN CREEK NEAR JEFFERSON, COLO.

Location.—At the highway bridge at Michigan Siding, in sec. 13, T. 8 S., R. 76 W., and $2\frac{1}{2}$ miles southwest of Jefferson. No tributary between the station and the mouth of Jefferson Creek, $3\frac{1}{2}$ miles below, and no important tributary for several miles above.

Records available.—October 17, 1910, to July 10, 1912.

Drainage area.—Not measured.

Gage.—Vertical staff.

Channel.—Somewhat shifting.

Discharge measurements.—Made from the bridge during high water and by wading at ordinary stages.

Winter flow.—Ice causes backwater during the winter months.

Diversions.—There are court decrees for diversions of 104 second-feet from Michigan Creek above the station and 40 second-feet below.

Accuracy.—Data insufficient for estimates of discharge.

Cooperation.—Station maintained in cooperation with the United States Forest Service.

The following estimate of discharge was made by H. B. Waha:

April 5, 1912: Estimate, 50 second-feet.

Daily gage height, in feet, of Michigan Creek near Jefferson, Colo., for 1912.

[Roy M. Truman, observer.]

Day.	Apr.	May.	June.	July.	Day.	Apr.	May.	June.	July.
1		1.3			16				
2			1.1		17	1.3			
3					18			1.55	
4					19		0.7		
5					20				
6					21				
7					22				
8				1.2	23				
9		.8	1.8		24	1.65			
10				1.1	25				
11	1.3				26				
12					27				
13					28		.9		
14					29			1.7	
15	1.1				30				
					31				

NORTH FORK OF SOUTH PLATTE RIVER AT GRANT, COLO.

Location.—At Grant post office, in sec. 9, T. 7 S., R. 74 W., in the Pike National Forest, 250 feet above the mouth of Geneva Creek.

Records available.—July 18, 1910, to December 6, 1912.

Drainage area.—51 square miles (measured from Forest Atlas).

Gage.—Vertical staff.

Channel.—Shifting.

Discharge measurements.—Made from footbridge and by wading.

Winter flow.—Ice causes backwater during the winter months and measurements are made to determine the flow.

Diversions.—There are court decrees for diversions of 5.5 second-feet from the North Fork above the station, and a decree for diversions of 24 second-feet from tributaries above.

Accuracy.—Owing to the high altitude of this station, alternate melting and freezing are likely to cause considerable diurnal fluctuations at certain seasons of the year, and the mean daily gage height based on one gage reading may be considerably in error. This, together with the scattering gage heights and shifting channel, makes the estimates at this station only fair.

Cooperation.—Station maintained in cooperation with the United States Forest Service.

Discharge measurements of North Fork of South Platte River at Grant, Colo., in 1912.

Date.	Hydrographer.	Gage height.	Dis-charge.	Date.	Hydrographer.	Gage height.	Dis-charge.
		<i>Feet.</i>	<i>Sec.-ft.</i>			<i>Feet.</i>	<i>Sec.-ft.</i>
Jan. 10 ^a	H. B. Waha	1.55	9.1	May 15	J. L. Mathias	1.66	28.3
31 ^a	G. H. Russell	1.28	5.1	June 15	do	2.41	117
Mar. 5 ^a	Mathias and Gray	1.20	5.4	28	Robert Follansbee	2.74	157
5 ^a	Fletcher and Gray	1.20	5.3	Sept. 13	R. H. Fletcher	1.62	23.5
Apr. 6	H. B. Waha	1.44	16.5	Oct. 22	R. Richards	1.63	20.0

^a Relation of gage height to discharge affected by ice.

Daily gage height, in feet, of North Fork of South Platte River at Grant, Colo., for 1912.

[Edmund Couch, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1.						2.40	2.70			1.60	1.60	
2.		1.28		1.20						1.60		
3.		1.28		1.20		2.30	2.70		1.68			2.50
4.			1.30	1.25		2.55					1.80	
5.		1.30	1.20					1.93		1.65	1.80	
6.			1.29	1.44			2.35		1.68		1.80	2.6
7.								1.93	1.68	1.65		
8.		1.50	1.29		1.75	2.70	2.40				1.55	
9.		1.50		1.40	1.65							
10.	1.55				1.65	2.60	2.40	1.88	1.63			
11.			1.29	1.40			2.40				1.55	
12.	1.30	1.40		1.40						1.65		
13.	1.30	1.40	1.20		1.65		2.35	1.88	1.62			
14.					1.75	2.40		1.88				
15.	1.27	1.40		1.30	1.66	2.45	2.30		1.65	1.65		
16.	1.25		1.15	1.30	1.65				1.67	1.65	1.60	
17.				1.30			2.30	1.88				
18.						2.40	2.20		1.65		1.60	
19.				1.30			2.20	1.88	1.65			
20.	1.25	1.40				2.40						
21.						2.45	2.20				1.80	
22.	1.25		1.15		2.30		2.10	1.68		1.65		
23.		1.40	1.15		2.30		2.20	1.68	1.62		1.80	
24.		1.40			2.35	2.8	2.20					
25.	1.25								1.62	1.60	2.00	
26.			1.20		2.40	2.7		1.68		1.60		
27.	1.25	1.30				2.7			1.62			
28.		1.30			2.40	2.7		1.68				
29.		1.30	1.20					1.68			2.00	
30.			1.20				2.20				2.00	
31.	1.28											

NOTE.—Relation of gage height to discharge affected by ice Jan. 1 to Mar. 23 and Nov. 21 to Dec. 6.

Daily discharge, in second-feet, of North Fork of South Platte River at Grant, Colo., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1.				7	30	110	153	77	30	21	19
2.				7	35	107	153	71	30	22	19
3.				7	35	96	153	65	30	22	25
4.				8.5	25	131	136	59	30	23	31
5.			5.4	12	25	136	120	53	30	24	31
6.				16	35	141	103	53	30	23	31
7.				16	35	147	106	53	30	22	24
8.				15	36	153	110	52	29	22	16
9.				14	28	146	110	50	28	22	16
10.	9.1			14	28	138	110	48	26	22	16
11.				14	28	131	110	48	26	22	16
12.				14	28	124	106	48	25	22	17
13.				13	28	117	103	48	25	22	17
14.				12	36	110	100	48	24	22	18
15.				10	28	117	96	48	24	22	18
16.				10	28	114	96	48	25	22	19
17.				10	39	112	96	48	24	22	19
18.				10	50	110	84	48	24	22	19
19.				10	62	110	84	48	24	22	17
20.				11	73	110	84	42	24	22	17
21.				11	85	117	84	36	23	22	17
22.				11	96	134	72	30	22	22	17
23.				11	96	151	84	30	22	21	17
24.				11	103	169	84	30	22	20	17
25.				11	106	161	84	30	22	19	17
26.			7	12	110	153	84	30	22	19	17
27.			7	12	110	153	84	30	22	19	17
28.			7	12	110	153	84	30	22	19	17
29.			7	15	110	153	84	30	22	19	17
30.			7	20	110	153	84	30	21	19	17
31.	5.1				110		80	30		19	

NOTE.—Discharge determined from three fairly well-defined rating curves. Discharge interpolated for days for which gage heights are missing. Mean discharge January, February, and March estimated from three discharge measurements and open-water flow of latter part of March.

Monthly discharge of North Fork of South Platte River at Grant, Colo., for 1912.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accu- racy.
	Maximum.	Minimum.	Mean.		
January.....			a 6.0	369	D.
February.....			a 5.5	316	D.
March.....			a 6.5	400	D.
April.....	20	7.0	11.9	708	C.
May.....	110	25	59.9	3,680	C.
June.....	169	96	132	7,860	C.
July.....	153	72	101	6,210	C.
August.....	77	30	44.9	2,760	C.
September.....	30	21	25.3	1,510	C.
October.....	24	19	21.3	1,310	C.
November.....	31		19.2	1,140	C.
The period.....				26,300	

a Estimated.

NORTH FORK OF SOUTH PLATTE RIVER AT CASSELLS, COLO.

Location.—At Cassells, in sec. 11, T. 7 S., R. 74 W., in Pike National Forest. The nearest tributary is a small stream entering from the south a short distance below.

Records available.—July 4, 1908, to December 3, 1912.

Drainage area.—128 square miles (measured from Forest Atlas).

Gage.—Chain gage, which replaced a vertical staff reading to the same datum.

Channel.—Somewhat shifting.

Discharge measurements.—Made from bridge.

Winter flow.—Ice causes backwater during the winter months and measurements are made to determine the flow.

Diversions.—There are no court decrees for diversions between this station and that at Grant except for 2 second-feet from tributaries.

Accuracy.—Owing to the high altitude of this station, alternate melting and freezing are likely to cause considerable diurnal fluctuations at certain seasons of the year, and the mean daily gage height based on night and morning readings may be somewhat in error. This, together with the somewhat shifting channel, makes the records only good.

Cooperation.—Station maintained in cooperation with the State engineer.

Discharge measurements of North Fork of South Platte River at Cassells, Colo., in 1912.

Date.	Hydrographer.	Gage height.	Dis-charge.	Date.	Hydrographer.	Gage height.	Dis-charge.
		<i>Feet.</i>	<i>Sec.-ft.</i>			<i>Feet.</i>	<i>Sec.-ft.</i>
Jan. 5 ^a	G. H. Russell.....	1.41	11.5	Apr. 7	H. B. Waha.....	1.14	38.1
30 ^a	do.....	1.11	15.4	May 16	J. L. Mathias.....	1.40	59.5
Feb. 23 ^a	do.....	1.09	12.8	June 15	do.....	2.35	316
Mar. 5 ^a	Mathias & Gray.....	.95	16.1	28	Robert Fallansbee.....	2.57	440
Apr. 6	H. B. Waha.....	1.19	42.0	Sept. 13	R. H. Fletcher.....	1.40	68.2
7	do.....	1.14	37.0	Oct. 21	R. Richards.....	1.31	55.4

a Relation of gage height to discharge affected by ice in stream.

Daily gage height, in feet, of North Fork of South Platte River at Cassells, Colo., for 1912.

[Lulu Cassell, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1.....	1.2	1.12	1.05	0.90	1.45	2.35	2.70	1.70	1.5	1.38	1.18	1.30
2.....	1.1	1.08	1.05	1.05	1.50	2.2	2.50	1.80	1.5	1.38	1.25	1.42
3.....	1.0	1.06	1.0	1.15	1.50	2.25	2.40	1.75	1.34	1.30	1.45
4.....	1.0	1.02	1.0	1.20	1.3	2.75	2.40	1.65	1.4	1.32	1.25
5.....	1.3	1.02	.95	1.25	1.4	2.9	2.30	1.65	1.35	1.38	1.20
6.....	1.25	1.0	.9	1.25	1.45	2.85	2.30	1.75	1.4	1.48	1.22
7.....	1.1	1.05	1.0	1.30	1.45	2.95	2.25	1.65	1.4	1.45	1.20
8.....	1.0	1.05	1.0	1.30	1.5	3.15	2.30	1.70	1.35	1.42	1.28
9.....	1.1	1.05	.98	1.20	1.5	2.45	2.50	1.65	1.32	1.35	1.28
10.....	1.1	1.05	1.0	1.10	1.3	2.45	2.40	1.70	1.42	1.40	1.30
11.....	1.15	1.05	1.1	1.20	1.29	2.4	2.40	1.6	1.4	1.38	1.28
12.....	1.15	1.05	.95	1.20	1.20	2.3	2.35	1.40	1.5	1.38	1.32
13.....	1.18	1.02	.95	1.00	1.20	2.3	2.30	1.55	1.42	1.50	1.30
14.....	1.12	1.0	.85	1.00	1.30	2.35	2.30	1.60	1.4	1.45	1.32
15.....	1.1	.98	.9	1.04	1.35	2.3	2.40	1.70	1.4	1.38	1.22
16.....	1.02	.88	1.00	1.40	2.4	2.3	1.7	1.45	1.40	1.22
17.....	1.2	.92	.9	1.02	1.60	2.4	2.20	1.6	1.38	1.28	1.50
18.....	1.24	1.02	.85	.95	1.70	2.3	2.15	1.7	1.42	1.28	1.38
19.....	1.2	1.0	1.0	1.00	1.75	2.25	2.10	1.65	1.4	1.28	1.35
20.....	1.22	1.0	.9	1.00	1.80	2.25	2.05	1.6	1.45	1.30	1.28
21.....	1.2	1.0	1.0	.95	2.10	2.25	2.00	1.7	1.38	1.31	1.45
22.....	1.24	1.0	1.05	1.00	1.95	2.3	2.0	1.6	1.4	1.12	1.42
23.....	1.24	1.05	1.05	1.03	2.05	2.7	2.10	1.6	1.36	1.12	1.48
24.....	1.15	1.07	.8	1.08	2.00	2.6	2.20	1.5	1.4	1.18	1.65
25.....	1.15	1.1	.85	1.05	2.45	2.6	2.10	1.5	1.35	1.14	1.45
26.....	1.19	1.02	.95	1.06	2.45	2.7	2.15	1.5	1.35	1.20	1.60
27.....	1.2	1.09	.95	1.00	2.30	2.8	2.10	1.42	1.38	1.25	1.70
28.....	1.05	1.1	.98	1.08	2.40	2.8	1.95	1.48	1.4	1.32	1.55
29.....	1.12	1.0	.8	1.15	2.5	2.9	1.85	1.45	1.32	1.22	1.60
30.....	1.08	1.0	1.45	2.85	2.9	1.75	1.48	1.32	1.15	1.65
31.....	1.0895	2.7	1.85	1.5	1.20

NOTE.—Gage heights distorted by ice Jan. 1 to Mar. 23 and Nov. 17 to Dec. 3.

Daily discharge, in second-feet, of North Fork of South Platte River at Cassells, Colo., for 1912.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1.....	16	18	74	315	520	115	80	65	41
2.....	16	29	80	250	395	135	80	65	49
3.....	16	38	80	270	340	125	74	60	55
4.....	16	43	55	555	340	105	67	57	49
5.....	16	49	67	660	290	105	61	65	43
6.....	15	49	74	625	290	125	67	77	45
7.....	15	55	74	700	270	105	67	74	43
8.....	15	55	80	860	290	115	61	70	53
9.....	15	43	80	368	395	105	57	61	53
10.....	15	33	55	368	340	115	70	67	55
11.....	14	43	54	340	340	95	67	65	53
12.....	14	43	43	290	315	67	80	65	57
13.....	14	25	43	290	290	88	70	80	55
14.....	14	25	55	315	290	95	67	74	57
15.....	14	28	61	290	340	115	67	65	45
16.....	13	25	67	340	290	115	74	67	45
17.....	13	27	95	340	250	95	65	53	40
18.....	13	22	115	290	232	115	70	53	40
19.....	13	25	125	270	215	105	67	53	40
20.....	13	25	135	270	200	95	74	55	40
21.....	12	22	215	270	185	115	65	56	40
22.....	12	25	172	290	185	95	67	35	40
23.....	12	27	200	520	215	95	62	35	40
24.....	12	31	185	455	250	80	67	41	40
25.....	15	29	368	455	215	80	61	37	40
26.....	22	30	368	520	232	80	61	43	40
27.....	22	25	290	590	215	70	65	49	40
28.....	24	31	340	590	172	77	67	57	40
29.....	12	38	395	660	148	74	57	45	40
30.....	25	74	625	660	125	77	57	38	40
31.....	22	148	80	43

NOTE.—Discharge determined from a well-defined rating curve. Discharge estimated Mar. 1-23 and Nov. 17-30. Mean discharge estimated for January and February from three discharge measurements.

Monthly discharge of North Fork of South Platte River at Cassells, Colo., for 1912.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accu- racy.
	Maximum.	Minimum.	Mean.		
January.....			a 14.0	861	C.
February.....			a 14.0	805	C.
March.....	25	12	15.5	953	C.
April.....	74	18	34.4	2,050	B.
May.....	625	43	167	10,300	B.
June.....	860	250	434	25,800	B.
July.....	520	125	268	16,500	B.
August.....	135	67	98.6	6,060	B.
September.....	80	57	67.1	3,990	B.
October.....	80	35	57.1	3,510	B.
November.....	57	40	45.3	2,700	C.
The period.....				73,600	

a Estimated.

GENEVA CREEK AT GRANT, COLO.

Location.—In the Pike National Forest, at highway bridge in sec. 9, T. 7 S., R. 74 W., at Grant post office, 300 feet above the mouth of creek.

Records available.—November 3, 1911, to December 6, 1912. From July 5, 1908, to November 3, 1911, a station was maintained at Sullivan's ranch, 3 miles above Grant. There are no tributaries between.

Drainage area.—74 square miles (measured from Forest atlas).

Gage.—Vertical staff.

Channel.—Somewhat shifting after high water.

Discharge measurements.—Made from bridge during high water and by wading at ordinary stages.

Winter flow.—Ice causes backwater during the winter months, and discharge measurements are made to determine the approximate flow.

Diversions.—There is a court decree for a diversion of 1 second-foot from Geneva Creek above the station, and a temporary reservoir decree for 1,480 acres from Geneva and Kerby creeks.

Accuracy.—Owing to the high altitude of this station there are liable to be considerable diurnal fluctuations at certain seasons of the year, due to alternate melting and freezing, and the mean daily gage height based on one gage reading may be considerably in error. This, together with the scattering gage heights, makes the estimates only fair.

Cooperation.—Station maintained in cooperation with the United States Forest Service.

Discharge measurements of Geneva Creek at Grant, Colo., in 1912.

Date.	Hydrographer.	Gage height.	Dis-charge.	Date.	Hydrographer.	Gage height.	Dis-charge.
		<i>Feet.</i>	<i>Sec.-ft.</i>			<i>Feet.</i>	<i>Sec.-ft.</i>
Jan. 9a	H. B. Waha.....	2.30	7.9	May 15	J. L. Mathias.....	1.27	31.1
31a	G. H. Russell.....	.94	8.8	June 15	do.....	2.20	238
Mar. 5b	Fletcher and Gray.....	.93	9.3	27	Robert Follansbee.....	2.53	405
5b	Mathias and Gray.....	.93	8.5	Aug. 6	do.....	1.70	93.0
Apr. 6	H. B. Waha.....	1.06	18.0	Sept. 13	R. H. Fletcher.....	1.20	38.4
8	do.....	1.16	23.5	Oct. 22	R. Richards.....	1.07	26.5

a Relation of gage height to discharge affected by ice cover over entire stream.

b Very little ice present and apparently no effect on gage height.

Daily gage height, in feet, of Geneva Creek at Grant, Colo., for 1912.

[Edmund Couch, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	Sept.	Oct.	Nov.	Dec.
1.							1.20	1.10	
2.		0.95		0.91				1.10	
3.		.95		.91		1.27			1.0
4.			0.92	.96				1.05	
5.		.97	.93				1.19	1.05	
6.			.92			1.20		1.05	1.2
7.						1.20			
8.		.95			1.37		1.22	1.05	
9.	2.3	.95	.95	1.16	1.27				
10.					1.27	1.20			
11.			.95	1.04				1.05	
12.	2.00	.95		1.09			1.22		
13.	2.00	.95	.93		1.25	1.20			
14.					1.25				
15.	1.1	.95		.99		1.20	1.25		
16.	1.1		.93	.99	1.15	1.20	1.25	1.0	
17.				.99					
18.						1.20		1.0	
19.				.99		1.20			
20.	1.1	.95							
21.								1.0	
22.	1.15		.93		1.75		1.30		
23.		.95	.93		1.75	1.20		1.0	
24.		.92			1.75				
25.	1.15					1.15	1.15	1.10	
26.			.91		2.05		1.15		
27.		.92				1.20			
28.		.92			2.08				
29.	.95	.95	.91					1.0	
30.			.91				1.10	1.0	
31.	.94								

NOTE.—Relation of gage height to discharge Jan. 1 to Mar. 11 and Nov. 24 to Dec. 6 affected by ice. Prior to high water in 1912 gage was attached to trees standing on the bank, but high water washed away bank leaving trees standing unsupported in stream. Gage heights, therefore, for period June to August are not published, being unreliable. On Sept. 12 a new vertical staff gage was securely braced to bank a few feet distant.

Daily discharge, in second-feet, of Geneva Creek at Grant, Colo., for 1912.

Day.	Mar.	Apr.	May.	Sept.	Oct.	Nov.	Day.	Mar.	Apr.	May.	Sept.	Oct.	Nov.
1.	9.0	8.6	40	46	37	29	16.	9.8	13	24	37	42	21
2.	9.0	8.6	40	44	37	29	17.	9.8	13	36	37	42	21
3.	9.0	8.6	40	43	36	27	18.	9.8	13	48	37	43	21
4.	9.0	12	25	41	36	25	19.	9.8	13	60	37	44	21
5.	9.0	14	30	39	36	25	20.	9.8	13	73	37	45	21
6.	9.0	17	40	37	37	25	21.	9.8	14	86	37	46	21
7.	9.0	19	40	37	38	25	22.	9.8	14	98	37	46	21
8.	9.0	22	42	37	39	25	23.	9.8	14	98	37	42	21
9.	9.0	24	33	37	39	25	24.	9.4	14	98	35	37	20
10.	9.0	20	33	37	39	25	25.	9.0	14	138	33	33	20
11.	9.0	16	32	37	39	25	26.	8.6	16	178	35	33	20
12.	9.0	19	32	37	39	24	27.	8.6	16	183	37	32	20
13.	9.8	17	31	37	40	23	28.	8.6	16	188	37	31	20
14.	9.8	15	31	37	41	23	29.	8.6	20	198	37	30	20
15.	9.8	13	28	37	42	22	30.	8.6	30	208	37	29	20
							31.	8.6		218		29	20

NOTE.—Discharge determined as follows: Mar. 13 to May 31 and Sept. 1 to Nov. 23 from two fairly well-defined curves. Discharge interpolated for days for which gage heights are missing. Discharge June to August not computed on account of unreliability of gage heights.

Monthly discharge of Geneva Creek at Grant, Colo., for 1912.

[Drainage area, 74 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
January.....	a 8.5	0.115	0.13	523	C.
February.....	a 8.5	.115	.12	489	D.
March.....	9.8	9.22	.125	.14	567	C.
April.....	8.6	15.6	.210	.23	928	C.
May.....	24	79.0	1.07	1.23	4,860	C.
September.....	46	33	37.7	.509	.57	2,240	C.
October.....	46	29	38.0	.514	.59	2,340	C.
November.....	29	22.8	.308	.34	1,360	C.
The period.....	13,300	

a Estimated.

SCOTT GOMER CREEK ¹ NEAR GRANT, COLO.

Location.—Near Sullivan's ranch, in sec. 19, T. 6 S., R. 74 W., in the Pike National Forest, about 5 miles above Grant, one-fourth mile above mouth of creek. No tributary enters between mouth and station.

Records available.—Fragmentary records August 16, 1909, to December 3, 1912.

Drainage area.—21 square miles (measured from topographic sheet).

Gage.—Vertical staff, moved to its present location, $2\frac{1}{2}$ miles below original site, September 4, 1909. Datum unchanged in new location, but has no determined relation to datum of original gage.

Channel.—Shifting after high water.

Discharge measurements.—Made by wading.

Winter flow.—Ice causes backwater during the winter months.

Diversions.—There are no court decrees for diversions above this station and therefore the records probably represent the natural run-off.

Accuracy.—Owing to the high altitude of this station there are liable to be considerable diurnal fluctuations at certain seasons of the year, due to alternate melting and freezing, and the mean daily gage height based on one gage height may be considerably in error. As there are so few gage heights, estimates have been made only for the days when the gage was read.

Cooperation.—Station maintained in cooperation with the United States Forest Service.

Discharge measurements of Scott Gomer Creek near Grant, Colo., in 1912.

Date.	Hydrographer.	Gage height.	Dis-charge.	Date.	Hydrographer.	Gage height.	Dis-charge.
		<i>Feet.</i>	<i>Sec.-ft.</i>			<i>Feet.</i>	<i>Sec.-ft.</i>
Jan. 10 ^a	H. B. Waha.....	1.20	3.6	June 16	J. L. Mathias.....	1.41	38.1
Mar. 6 ^a	Mathias and Gray.....	.85	2.6	27	Robert Follansbee.....	2.00	101.
6 ^a	Fletcher and Gray.....	.85	2.3	Aug. 6	do.....	1.20	29.5
Apr. 8	H. B. Waha.....	1.18	6.0	Oct. 22	R. Richards.....	.81	12.9
May 16	J. L. Mathias.....	1.18	5.6				

a Relation of gage height to discharge affected by ice.

¹ Also called East Geneva Creek.

Daily gage height, in feet, of Scott Gomer Creek near Grant, Colo., for 1912.

[Edmund Couch, observer.]

[illegible]

NOTE.—Relation of gage height to discharge Jan. 1 to Mar. 16 and Nov. 21 to Dec. 3 affected by ice.

Daily discharge, in second-feet, of Scott Gomer Creek near Grant, Colo., for 1912.

[illegible]

CLEAR CREEK AT IDAHO SPRINGS, COLO.

Location.—At Idaho Springs, in sec. 36, T. 3 S., R. 73 W., one-half mile below mouth of Chicago Creek, and one-fourth mile above entrance of Soda Creek and Virginia Canyon.

Records available.—October 8, 1910, to September 27, 1912.

Drainage area.—239 square miles (measured from Forest Atlas).

Gage.—A staff gage placed March 23, 1911, a short distance upstream from the original staff gage, which was used until that date. The new gage was referred to a datum 0.2 foot lower than the original. All readings have been referred to the latter gage.

Channel.—Slightly shifting.

Discharge measurements.—Made by wading.

Winter flow.—Ice causes backwater during the winter months.

Diversions.—There are no court decrees for diversions above the station, but the records do not represent the natural flow at all times, as water is diverted from Fraser River in the Grand basin into Clear Creek by means of a tunnel and canal entering the West Fork. This diversion has a court decree for 53 second-feet. During 1912 about 500 acre-feet were diverted.

Artificial control.—The operation of two power plants some 12 miles above the station causes a daily fluctuation of 0.10 foot or more at the gage during the lower water period.

Accuracy.—Owing to the high altitude of this station, considerable diurnal fluctuations are likely to be caused at certain seasons of the year by the alternate melting and freezing, and the mean daily gage height based on one reading may be considerably in error. This, together with the shifting channel, makes the records only fair, or possibly good.

Cooperation.—Station maintained in cooperation with the United States Forest Service.

Discharge measurements of Clear Creek at Idaho Springs, Colo., in 1912.

Date.	Hydrographer.	Gage height.	Dis-charge.	Date.	Hydrographer.	Gage height.	Dis-charge.
		<i>Feet.</i>	<i>Sec.-ft.</i>			<i>Feet.</i>	<i>Sec.-ft.</i>
Feb. 7 ^a	H. B. Waha.....	0.74	40.4	Apr. 29	J. L. Mathias.....	.83	63.4
Mar. 8 ^a	Mathias & Gray.....	.56	43.3	May 20	do.....	1.98	285
8 ^b	Waha & Gray.....	.56	42.8	June 18	H. B. Waha.....	2.85	612
Mar. 26	J. L. Mathias.....	.49	32.4				

^a Relation of gage height to discharge affected by ice.

Daily gage height, in feet, of Clear Creek at Idaho Springs, Colo., for 1912.

[W. B. Kelso, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1.....				0.55			4.7		
2.....		1.9		.65			4.1		1.15
3.....							4.0		
4.....				.6			3.8	2.5	
5.....				.75			3.5	2.6	1.3
6.....				.65		4.0			
7.....			0.74	0.6		4.3	3.3		1.25
8.....				.6		4.4	3.5		
9.....	2.0		.56			4.4	3.7		
10.....		.60		.7		3.9	3.5		1.25

Daily gage height, in feet, of Clear Creek at Idaho Springs, Colo., for 1912—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
11.....				.55	0.85			1.8	
12.....				.65					
13.....				.55	1.1	3.7	3.6		
14.....					.9	3.6			
15.....		0.50	.50		1.0	3.5	3.6		1.15
16.....			.45		.95		3.6		1.2
17.....			.45	.6	1.1	3.1	3.6		
18.....	0.9		.38		1.5	2.9	3.4		
19.....			.55					1.9	
20.....			.55		2.0				1.35
21.....			.70						
22.....			.7	.6			3.3		
23.....			.55	.65		4.1	3.3		
24.....		.50		.8		4.6	3.2	1.65	
25.....				.7	2.6				1.1
26.....			.5	.67	2.9			1.55	
27.....	.55		.65		2.9		3.2		1.15
28.....			.45		2.8				
29.....		.50		.6	2.8	4.8	3.0		
30.....	.50		.52	.85	3.2	5.0	3.0		
31.....							3.0	1.55	

NOTE.—Ice present Jan. 1 to Mar. 22.

Daily discharge, in second-feet, of Clear Creek at Idaho Springs, Colo., for 1911.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1.....	25	42	61	372	372	190	103	58	68
2.....	25	43	75	410	414	182	103	61	69
3.....	25	44	89	410	456	171	103	72	65
4.....	25	45	103	435	498	161	103	83	61
5.....	25	46	117	460	665	151	103	94	54
6.....	25	48	131	460	680	144	98	94	62
7.....	25	50	151	510	622	138	93	112	70
8.....	25	52	171	535	585	131	87	100	77
9.....	25	54	171	585	522	131	81	89	62
10.....	25	56	192	522	460	131	75	77	46
11.....	25	57	226	541	448	131	69	86	61
12.....	25	58	260	560	436	131	73	78	61
13.....	25	59	171	572	423	131	77	70	61
14.....	25	60	171	554	410	131	72	61	50
15.....	25	61	171	535	385	122	66	54	50
16.....	25	58	192	510	382	131	61	46	50
17.....	25	55	202	485	379	131	40	46	50
18.....	25	52	235	485	376	122	58	48	50
19.....	25	49	224	485	372	112	77	50	50
20.....	40	46	213	498	341	132	89	51	50
21.....	38	50	202	511	310	151	100	52	50
22.....	36	54	192	523	298	145	112	53	50
23.....	33	58	202	535	285	138	46	54	50
24.....	46	60	213	510	272	131	46	54	50
25.....	45	64	228	476	260	126	46	54	50
26.....	44	69	243	443	248	121	44	56	50
27.....	43	77	257	410	236	116	42	58	50
28.....	42	73	271	385	224	112	40	60	50
29.....	41	69	285	410	213	108	47	62	50
30.....	40	65	310	391	206	103	54	64	50
31.....	41		335		198	103		66	

NOTE.—Discharge determined from a fairly well defined rating curve. Discharge interpolated for days for which gage heights are missing. Mean discharge January, February, and December estimated from actual discharge measurements and by comparison. Mean discharge Mar. 1-19 estimated 25 second-feet.

Daily discharge, in second-feet, of Clear Creek at Idaho Springs, Colo., for 1912.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Day.	Apr.	May.	June.	July.	Aug.	Sept.
1	34	68	718	1,170	623	204	16	32	84	750	840	330	165
2	47	68	757	990	586	155	17	32	110	690	840	333	150
3	44	68	796	960	548	166	18	32	185	630	780	336	134
4	40	68	834	900	510	178	19	32	235	702	773	340	118
5	62	68	872	810	540	190	20	32	285	774	766	328	102
6	47	68	910	780	503	184	21	32	320	846	758	315	111
7	44	68	1,000	750	466	178	22	32	355	918	750	302	120
8	40	68	1,030	810	429	178	23	40	390	990	750	290	129
9	47	68	1,030	870	391	178	24	60	325	1,140	720	278	137
10	54	68	880	810	353	178	25	45	460	1,150	720	265	145
11	34	68	860	820	315	174	26	41	535	1,160	720	252	150
12	47	89	840	830	318	170	27	38	535	1,180	720	252	155
13	34	110	820	840	321	165	28	35	510	1,190	690	252	125
14	34	76	840	840	324	160	29	32	535	1,200	660	252	125
15	33	93	810	840	327	155	30	68	640	1,260	660	252	125
							31		679		660	252

NOTE.—Discharge determined from three parallel curves and by the indirect method for shifting channels. Discharge interpolated for days of missing gage heights. Mean discharge January to March estimated from actual discharge measurements and by comparison.

Monthly discharge of Clear Creek at Idaho Springs, Colo., for 1911-12.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accu- racy.
	Maximum.	Minimum.	Mean.		
1911.					
January			a 20	1,230	D.
February			a 22	1,270	D.
March	46	25	31.1	1,910	C.
April	77	42	55.8	3,320	B.
May	335	61	196	12,100	B.
June	585	372	484	28,800	B.
July	680	198	386	23,700	B.
August	190	103	134	8,240	B.
September	103	40	73.6	4,380	B.
October	112	46	66.5	4,090	B.
November	77	46	55.6	3,310	C.
December			a 40	2,460	D.
The year	680		130	94,800	
1912.					
January			a 30.0	1,840	D.
February			a 30.0	1,730	D.
March			a 35.0	2,150	D.
April	68	32	40.8	2,430	C.
May	679	68	235	14,400	C.
June	1,260	718	919	54,700	C.
July	1,170	660	801	49,300	C.
August	623	252	361	22,200	C.
September	204	102	153	9,100	C.
The period				158,000	

a Estimated.

CLEAR CREEK AT FORKSCREEK, COLO.

Location.—At Forkscreek, a few hundred feet below the mouth of North Clear Creek.

Records available.—May 29, 1899, to November 4, 1912.

Drainage area.—345 square miles.

Gage.—A chain gage was installed June 3, 1907, 50 feet upstream from first site. The original gage had been moved 30 feet upstream on July 19, 1905, but set to read the same as before. The chain gage was also referred to the same datum.

Channel.—Very shifting, requiring frequent discharge measurements.

Discharge measurements.—Made from footbridge and by wading.

Winter flow.—Ice causes backwater during the winter months and measurements are made to determine the flow.

Diversions.—There are no court decrees for diversions between Idaho Springs and Forkscreek.

Artificial control.—The natural flow is regulated to some extent by storage in various ponds and reservoirs above.

Accuracy.—Owing to the very shifting channel the estimates have been obtained by the indirect method and can only be considered approximate. The station was discontinued, as the station near Golden gives much better results.

Cooperation.—Station maintained in cooperation with the State engineer.

Discharge measurements of Clear Creek at Forkscreek, Colo., in 1912.

Date.	Hydrographer.	Gage height.	Dis-charge.	Date.	Hydrographer.	Gage height.	Dis-charge.
		<i>Feet.</i>	<i>Sec.-ft.</i>			<i>Feet.</i>	<i>Sec.-ft.</i>
Jan. 13 ^a	G. H. Russell.....	5.90	32.4	Apr. 29	J. L. Mathias.....	5.58	63.6
Feb. 16 ^a	do.....	5.34	26.1	May 21 ^b	do.....	6.40	341
Mar. 8 ^a	Mathias & Gray.....	5.51	42.3	June 18	H. B. Waha.....	6.35	746
8 ^a	Waha & Gray.....	5.51	36.9	Aug. 30	R. Richards.....	4.90	250

^a Relation of gage height to discharge affected by ice. Heavy ice at control Jan. 13 and Feb. 16. Very slight ice effect on Mar. 8.

^b This discharge is the sum of the discharges of North Clear Creek and Clear Creek above the confluence with North Clear Creek.

Daily gage height, in feet, of Clear Creek at Forkscreek, Colo., for 1912.

[J. Z. Lear, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1.....	7.1	5.4	5.98	5.25	5.58	7.88	8.0	6.4	4.5	3.9
2.....	7.1	5.4	6.2	5.32	5.58	6.87	6.33	4.9	4.5	3.9
3.....	7.1	5.5	5.45	5.68	7.97	6.8	6.43	4.9	4.5
4.....	7.0	5.65	6.02	5.48	5.7	7.8	4.9	4.45	3.8
5.....	7.0	5.85	6.1	8.13	7.2	6.4	4.85	4.45
6.....	6.8	5.95	5.95	5.62	5.6	8.06	7.03	6.3	4.8
7.....	6.6	5.95	5.7	5.68	8.13	7.2	6.13	4.8	4.45
8.....	6.4	6.25	5.45	5.62	5.72	8.2	7.47	6.13	4.45
9.....	6.1	6.2	6.0	5.65	5.7	7.35	6.13	4.75	4.45
10.....	6.1	6.0	5.62	7.55	7.33	6.13	4.72	5.28
11.....	6.1	6.0	5.52	5.55	5.7	7.52	7.33	6.1	4.75	4.45
12.....	6.1	5.8	5.62	7.36	7.28	6.02	4.7	4.45
13.....	5.9	5.55	5.58	5.68	7.16	7.23	5.7	4.7
14.....	5.9	5.9	5.62	5.65	6.57	5.55	4.7	4.45
15.....	5.9	5.65	5.55	5.42	5.68	6.6	7.63	5.6	4.4
16.....	5.9	5.5	5.55	5.52	5.68	7.52	5.7	4.7	4.38
17.....	5.9	6.0	5.58	5.72	6.46	7.07	5.6	4.65	4.35
18.....	5.9	5.35	5.55	5.95	6.43	6.9	4.6	4.3
19.....	5.95	5.42	5.48	6.53	6.8	5.3	4.6	4.3
20.....	5.95	5.38	6.35	6.53	6.67	5.22	4.6
21.....	5.85	5.48	5.38	6.43	5.28	4.6	4.45
22.....	5.95	5.92	5.32	5.32	6.85	6.78	6.87	5.3	4.6	4.35
23.....	5.95	6.03	5.4	5.45	6.9	6.63	5.22	4.55	4.3
24.....	5.85	6.1	5.55	7.05	8.43	6.37	5.2	4.5	4.25
25.....	5.85	5.28	5.58	7.02	8.5	6.37	4.5	4.2
26.....	6.0	6.05	5.62	8.23	6.37	5.1	4.5	4.25
27.....	6.0	6.1	5.32	7.23	8.7	6.47	5.1	4.5
28.....	5.95	6.3	5.28	7.05	8.73	6.37	5.0	4.5	4.3
29.....	5.95	5.35	5.58	7.22	8.65	6.33	5.0	4.2
30.....	5.8	5.25	5.58	6.53	4.9	4.5	4.2
31.....	5.8	7.83	6.3	4.95	4.2

NOTE.—Relation of gage height to discharge affected by ice Jan. 1 to Mar. 23

Daily discharge, in second-feet, of Clear Creek at Forkscreek, Colo., for 1912.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
1.....		34	65	1,160	1,330	770	254	130
2.....		39	65	1,180	934	746	245	130
3.....		50	83	1,200	910	780	245	130
4.....		52	87	1,130	980	775	245	122
5.....		62	78	1,290	1,050	770	230	122
6.....		72	68	1,270	990	735	215	122
7.....		72	83	1,290	1,050	676	215	122
8.....		72	92	1,320	1,140	676	208	122
9.....		78	87	1,210	1,100	676	200	122
10.....		72	87	1,100	1,100	676	191	378
11.....		61	87	1,090	1,100	665	200	122
12.....		72	85	1,010	1,080	637	185	122
13.....		63	83	930	1,060	525	185	122
14.....		55	78	778	1,130	472	185	122
15.....		47	83	790	1,200	490	185	115
16.....		57	83	762	1,160	525	185	113
17.....		65	92	734	1,000	490	170	110
18.....		61	156	722	945	438	155	105
19.....		52	238	816	910	385	155	105
20.....		48	320	816	865	357	155	114
21.....		43	510	780	900	378	155	122
22.....		39	700	903	935	385	155	110
23.....		50	725	1,190	850	357	142	105
24.....		61	780	1,480	760	250	130	100
25.....	36	65	775	1,500	760	332	130	95
26.....	38	72	810	1,410	760	315	130	100
27.....	39	70	850	1,580	795	315	130	102
28.....	36	67	780	1,590	760	280	130	105
29.....	41	65	895	1,560	746	280	130	95
30.....	34	65	1,020	1,440	816	245	130	95
31.....	34		1,140		735	262		95

NOTE.—Discharge determined as follows: Mar. 25 to May 21, from a fairly well-defined curve; May 22 to June 18, by indirect method for shifting channels; June 19 to Oct. 31, from a poorly defined curve. Discharge interpolated for days on which gage was not read. Mean discharge January, February, and March estimated on basis of actual discharge measurements and open-water flow of latter part of March.

Monthly discharge of Clear Creek at Forkscreek, Colo., for 1912.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accu- racy.
	Maximum.	Minimum.	Mean.		
January.....			a 30	1,840	D.
February.....			a 30	1,730	D.
March.....			a 35	2,150	D.
April.....	78	34	59.4	3,530	C.
May.....	1,140	65	358	22,000	C.
June.....	1,590	722	1,130	67,200	D.
July.....	1,330	735	963	59,200	D.
August.....	780	245	508	31,200	D.
September.....	254	130	179	10,700	D.
October.....	378	95	122	7,500	D.
The period.....				207,000	

a Estimated.

CLEAR CREEK NEAR GOLDEN, COLO.

Location.—About 2 miles above Golden, in sec. 6, T. 4 S., R. 70 W., and a short distance below the headgate of the Golden ditch. The only tributary of importance between the station and the mouth is Ralston Creek, which enters about 12 miles below.

Records available.—December 4, 1908, to December 31, 1909; June 8 to September 24, 1911; January 1 to December 31, 1912.

Drainage area.—Approximately 380 square miles.

Gage.—Automatic recording gage, whose datum has remained unchanged.

Channel.—Slightly shifting.

Discharge measurements.—Made from car and cable located near the gage.

Winter flow.—Ice causes backwater during the winter months, but discharge measurements are made to determine the approximate winter flow.

Diversions.—Between Forkscreek and the station near Golden there is a court decree for a diversion of 26 second-feet by the Golden ditch. From March 5 to October 22, 1912, the ditch diverted water at an average rate of 18.3 second-feet, diverting a total amount of 4,170 second-feet. This does not represent the entire amount in the flume at the station as there is a waterway below Clear Creek station and above the measuring flume in the ditch. Below the Golden station there are decrees for diversions of 1,642 second-feet.

Accuracy.—Conditions are favorable for accurate results, and the records should be reliable.

Cooperation.—Station maintained in cooperation with the Denver Reservoir Irrigation Co.

The following discharge measurements of the Golden ditch were made in the flume above the gaging station on Clear Creek, near Golden, Colo.:

Discharge measurements of flume at station near Golden, Colo., in 1912.

Date.	Hydrographer.	Dis-charge.	Date.	Hydrographer.	Dis-charge.
		<i>Sec.-ft.</i>			<i>Sec.-ft.</i>
Feb. 19	Russell & Gray.....	0	May 18	J. L. Mathias.....	22.7
Mar. 9	Mathias & Gray.....	0	27	Gray & Follansbee	a 18.0
9	Waha & Gray.....	0	June 10	G. A. Gray.....	a 25.0
Apr. 27	G. A. Gray.....	8.8			

a Estimated.

Discharge measurements of Clear Creek near Golden, Colo., in 1912.

Date.	Hydrographer.	Gage height.	Dis-charge.	Date.	Hydrographer.	Gage height.	Dis-charge.
		<i>Feet.</i>	<i>Sec.-ft.</i>			<i>Feet.</i>	<i>Sec.-ft.</i>
Feb. 19 ^a	Russell & Gray.....	1.06	26.8	May 27	Gray & Follansbee.....	3.00	705
Mar. 9 ^a	Mathias & Gray.....	1.40	41.0	June 10	G. A. Gray.....	3.55	1,220
9 ^a	Waha & Gray.....	1.40	39.7	Aug. 30	R. Richards.....	1.97	250
Apr. 27	G. A. Gray.....	1.06	53.5	Oct. 26	do.....	1.45	102
May 18	J. L. Mathias.....	1.89	234	Dec. 12 ^a	R. H. Fletcher.....	2.17	54

a Relation of gage height to discharge affected by ice.

Daily gage height, in feet, and discharge, in second-feet, of Clear Creek near Golden, Colo., for 1911.

Day.	June.		July.		August.		September.	
	Gage height.	Dis-charge.	Gage height.	Dis-charge.	Gage height.	Dis-charge.	Gage height.	Dis-charge.
1.			2.54	453	1.93	229	1.50	120
2.			2.84	595	1.89	218	1.51	122
3.			3.26	842	1.87	212	1.62	150
4.			3.28	856	1.82	200	1.58	140
5.			3.58	1,080	1.78	190	1.52	125
6.			3.75	1,220	1.72	175	1.50	120
7.			3.44	972	1.70	170	1.46	112
8.	3.27	849	3.10	740	1.64	155	1.34	88
9.	3.34	898	2.93	642	1.62	150	1.47	114
10.	3.16	776	2.94	647	1.75	185	1.45	110
11.	3.14	764	2.79	570	1.91	223	1.39	98
12.	3.25	835	2.67	512	1.76	188	1.41	102
13.	3.31	877	2.64	498	1.65	158	1.42	104
14.	3.18	788	2.63	494	1.66	160	1.35	90
15.	3.24	828	2.49	431	1.65	158	1.36	92
16.	3.20	800	2.44	411	1.66	160	1.34	88
17.	2.99	675	2.46	419	1.68	165	1.63	152
18.	2.90	625	2.42	403	1.68	165	1.51	122
19.	3.01	686	2.40	395	1.60	145	1.50	120
20.	2.90	625	2.33	367	1.60	145	1.50	120
21.	2.90	625	2.28	348	1.72	175	1.50	120
22.	3.00	680	2.28	348	1.79	197		107
23.	3.10	740	2.18	313	1.80	200		94
24.	3.10	740	2.13	296	1.94	232	1.30	80
25.	3.04	704	2.07	274	1.80	200	1.31	82
26.	2.87	610	2.04	264	1.78	190	1.31	82
27.	2.79	570	2.05	268	1.64	155	1.31	82
28.	2.69	520	2.03	260	1.62	150	1.31	82
29.	2.65	502	2.00	250	1.62	150	1.31	82
30.	2.61	485	1.94	232	1.55	132	1.45	110
31.			1.92	226	1.53	128		

NOTE.—A maximum gage height of 4.4 feet occurred on July 3. Discharge determined from a curve drawn parallel to the 1912 curve above 680 second-feet, and converging with the 1912 curve below 200 second-feet. Below 200 second-feet the curve is well defined and above that point fairly well defined.

Daily gage height, in feet, of Clear Creek near Golden, Colo., for 1912.

[John Trafford, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1.					1.43	3.2	4.5	3.2	1.86	1.54	1.41
2.					1.55	3.1	4.3	3.0	1.89	1.55	1.43
3.					1.58	3.2	4.2	2.85	1.88	1.55	1.53
4.					1.50	3.5	4.0	2.75	1.74	1.58	1.47
5.					1.35	3.7	3.6	2.75	1.69	1.58	1.45
6.					1.41	4.0	3.4	2.65	1.74	1.56	1.37
7.					1.40	3.8	3.5	2.65	1.76	1.55	1.45
8.					1.52	3.8	3.6	2.65	1.66	1.59	1.39
9.					1.66	3.8	3.7	2.55	1.81	1.58	1.36
10.					1.70	3.5	3.6	2.35	1.86	1.59	1.34
11.					1.50	3.4	3.6	2.3	1.74	1.56	1.33
12.					1.60	3.4	3.8	2.45	1.72	1.52	1.52	2.17
13.					1.50	3.4	3.6	2.4	1.66	1.49	1.33
14.					1.55	3.3	3.7	2.4	1.69	1.51	1.33
15.					1.70	3.3	3.8	2.4	1.66	1.54	1.27
16.					1.75	3.2	3.7	2.4	1.67	1.54	1.17
17.					1.75	3.2	3.5	2.5	1.67	1.53	1.15
18.					1.92	3.0	3.5	2.3	1.64	1.53	1.24
19.					2.15	3.0	3.5	1.65	1.51	1.30
20.					2.20	3.1	3.4	1.68	1.51	1.24
21.					2.40	3.3	3.5	2.2	1.63	1.53	1.22
22.					2.65	3.4	3.3	2.1	1.58	1.48	1.22
23.					2.75	3.8	3.2	2.05	1.57	1.51	1.28
24.					1.00	2.80	4.2	3.2	2.0	1.61	1.49	1.26
25.					1.00	2.80	4.4	3.2	1.96	1.58	1.45	1.29
26.					1.00	3.00	4.2	3.2	1.93	1.56	1.44
27.					1.10	3.00	4.4	3.2	1.85	1.56	1.47
28.					1.10	2.90	4.6	3.1	1.85	1.53	1.49
29.					1.15	2.90	4.7	3.2	1.89	1.49	1.43
30.					1.25	3.2	5.0	2.95	1.94	1.51	1.44
31.					3.3	3.0	1.91	1.43

NOTE.—Ice present January, February, March, and December. Maximum gage height of 5.25 feet occurred on June 30.

Daily discharge, in second-feet, of Clear Creek near Golden, Colo., for 1912.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1.....		106	880	2,070	880	218	130	102
2.....		132	810	1,870	740	227	132	106
3.....		140	880	1,770	650	224	132	127
4.....		120	1,110	1,570	590	182	140	114
5.....		90	1,290	1,200	590	167	140	110
6.....		102	1,570	1,030	535	182	135	94
7.....		100	1,380	1,110	535	188	132	110
8.....		125	1,380	1,200	535	160	143	98
9.....		160	1,380	1,290	485	203	140	92
10.....		170	1,110	1,200	390	218	143	88
11.....		120	1,030	1,200	370	182	135	86
12.....		145	1,030	1,380	435	176	125	84
13.....		120	1,030	1,200	410	160	118	86
14.....		132	950	1,290	410	167	122	86
15.....		170	950	1,380	410	160	130	76
16.....		185	880	1,290	410	162	130	62
17.....		185	880	1,110	460	162	127	60
18.....		236	740	1,110	370	155	127	71
19.....		310	740	1,110	357	157	122	80
20.....		330	810	1,030	344	165	122	71
21.....		410	950	1,110	330	152	127	68
22.....		535	1,030	950	290	140	116	68
23.....	45	590	1,380	880	275	138	122	77
24.....	45	620	1,770	880	260	147	118	74
25.....	45	620	1,970	880	248	140	110	78
26.....	45	740	1,770	880	239	135	108
27.....	55	740	1,970	880	215	135	114
28.....	55	680	2,170	810	215	127	118
29.....	60	680	2,270	880	227	118	106
30.....	72	880	2,580	710	242	122	108
31.....		950		740	233	106

NOTE.—Discharge determined from a well-defined rating curve. Discharge Apr. 1-22 and Nov. 26-30 estimated at 60 and 65 second-feet, respectively. Mean discharge January, February, March, and December estimated from actual discharge measurements.

Monthly discharge of Clear Creek near Golden, Colo., for 1911-12.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accu- racy.
	Maximum.	Minimum.	Mean.		
1911.					
June (23 days).....	898	485	704	32,100	C.
July.....	1,220	226	504	31,000	C.
August.....	232	128	176	10,800	B.
September.....	152	82	104	6,190	B.
1912.					
January.....			a 32	1,970	D.
February.....			a 30	1,730	D.
March.....			a 40	2,460	D.
April.....	72		58.7	3,490	C.
May.....	950	90	343	21,100	A.
June.....	2,580	740	1,290	76,800	A.
July.....	2,070	710	1,200	71,400	A.
August.....	880	215	409	25,100	A.
September.....	227	118	166	9,880	A.
October.....	143	106	125	7,690	A.
November.....	127	60	83.1	4,940	B.
December.....			a 50.0	3,070	D.
The year.....	2,580		319	230,000	

^a Estimated.

ST. VRAIN CREEK AT LYONS, COLO.

Location.—Three-fourths of a mile below Lyons, in sec. 17, T. 3 N., R. 70 W., one-fourth mile below the junction of North and South St. Vrain creeks, and just below Stone Canyon.

Records available.—August 1, 1887, to October 31, 1890; June 13, 1895, to October 31, 1903; July 1, 1904, to December 31, 1912.

Drainage area.—209 square miles.

Gage.—Inclined staff gage installed August 9, 1909, at practically the same datum as the inclined staff gage used from 1895 to 1903. It is not known whether the gage used prior to 1895 was located at the present site.

Channel.—Character not known, as only computed records are received.

Discharge measurements.—Made from car and cable.

Winter flow.—Ice causes backwater during a portion of the winter months.

Diversions.—There are court decrees for the diversion of 166 second-feet from the St. Vrain and tributaries above the station. Below there are court decrees for 1,632 second-feet from St. Vrain Creek and flood-water diversions of 190,000 acre-feet.

Cooperation.—From 1887 to 1890 and from July 1, 1904, to 1912, the station was maintained by the State engineer, by whom the records have been furnished.

Discharge measurements of St. Vrain Creek at Lyons, Colo., in 1912.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		<i>Feet.</i>	<i>Sec.-ft.</i>			<i>Feet.</i>	<i>Sec.-ft.</i>
Jan. 18	C. E. Turner.....	1.82	15	July 6	D. L. Bundy.....	3.82	541
Mar. 7	do.....	1.71	9	Aug. 14	do.....	2.85	177
Apr. 10	do.....	2.45	88	Sept. 26	do.....	2.30	60
May 15	do.....	3.45	364	Nov. 23	M. E. Bunger.....	2.12	39
June 5	D. L. Bundy.....	3.85	531				

Daily gage height, in feet, of St. Vrain Creek at Lyons, Colo., for 1912.

[Lloyd Hess, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1.....	0	1.80	0	1.90	2.70	3.40	4.70	3.70	2.60	2.30	2.00
2.....	0	1.80	0	1.90	2.80	3.40	4.20	3.50	2.50	2.30	2.10
3.....	0	1.70	0	2.00	2.80	3.70	4.20	3.30	2.50	2.20	2.10
4.....	0	1.70	0	1.95	2.70	3.80	4.10	3.20	2.45	2.20	2.00
5.....	0	1.70	0	2.00	2.75	3.90	3.95	3.10	2.50	2.20	2.00
6.....	0	1.70	0	2.10	2.80	4.00	3.80	3.05	2.40	2.20	2.00
7.....	0	1.70	0	2.10	2.90	3.90	3.90	2.95	2.40	2.20	2.00
8.....	0	1.70	0	2.20	2.90	4.05	4.00	2.90	2.30	2.05	2.00
9.....	0	1.70	0	2.30	2.90	4.40	4.00	2.90	2.30	2.05	2.00
10.....	0	1.60	1.70	2.50	3.00	4.05	4.00	2.80	2.45	1.90	2.10
11.....	0	0	1.70	2.40	3.15	4.00	4.00	2.80	2.50	2.30	2.15
12.....	0	0	0	2.40	3.40	4.10	3.75	2.80	2.50	2.60	2.15
13.....	0	0	0	2.30	3.65	4.10	3.95	2.80	2.40	2.70	2.10
14.....	0	0	0	2.30	3.85	4.00	4.00	2.80	2.40	2.70	2.00
15.....	0	0	0	2.20	3.90	3.80	3.95	2.85	2.50	2.60	2.00
16.....	0	0	0	2.30	4.05	3.60	4.30	2.85	2.60	2.60	2.00
17.....	1.70	0	1.80	2.25	3.95	3.60	3.70	2.80	2.55	2.60	2.00
18.....	1.80	0	1.70	2.20	3.90	3.55	3.60	2.70	2.55	2.50	2.00
19.....	1.80	0	1.70	2.15	3.80	3.50	3.65	2.70	2.50	2.40	2.00
20.....	1.75	0	1.80	2.20	3.85	3.55	3.70	2.65	2.40	2.40	1.95
21.....	1.70	0	1.85	2.30	3.90	3.70	3.50	2.60	2.30	2.35	1.90
22.....	1.80	1.80	1.95	2.20	3.80	3.80	3.40	2.55	2.35	2.30	1.90
23.....	1.80	1.80	2.00	2.20	3.65	4.20	3.65	2.60	2.30	2.25	1.90
24.....	1.80	1.80	2.00	2.30	3.50	4.40	3.60	2.50	2.30	2.15	1.90
25.....	1.80	0	2.00	2.40	3.45	4.70	3.60	2.50	2.30	2.10	1.90
26.....	1.80	0	2.00	2.50	3.60	4.60	3.80	2.50	2.30	2.20	1.90
27.....	1.80	0	2.00	2.45	3.60	4.50	3.80	2.60	2.30	2.20	1.90
28.....	1.80	0	2.10	2.55	3.10	4.70	3.40	2.60	2.30	2.10	1.90
29.....	1.80	0	2.00	2.70	3.05	4.60	3.30	2.70	2.30	2.00	1.90
30.....	1.80	2.00	2.70	3.20	4.50	3.30	2.70	2.30	2.00	1.90
31.....	1.80	2.00	3.60	3.70	2.60	1.90

Daily discharge, in second-feet, of St. Vrain Creek at Lyons, Colo., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1.....	3	13	3	19	138	342	998	470	118	66	28
2.....	3	13	3	19	160	342	723	382	98	66	38
3.....	3	8	3	28	160	470	723	306	98	52	38
4.....	3	8	3	24	138	516	668	270	90	52	28
5.....	3	8	3	28	149	564	590	238	98	52	28
6.....	3	8	3	38	160	616	516	224	82	52	28
7.....	3	8	3	38	184	564	564	197	82	52	28
8.....	3	8	3	52	184	642	616	184	66	33	28
9.....	3	8	3	66	184	833	616	184	82	33	28
10.....	3	5	8	98	210	642	616	160	90	19	38
11.....	3	3	8	82	254	616	616	160	98	66	45
12.....	3	3	3	82	342	668	493	160	98	118	45
13.....	3	3	3	66	448	668	590	160	82	138	38
14.....	3	3	3	66	540	616	616	160	82	138	28
15.....	3	3	3	52	564	516	590	172	98	118	28
16.....	3	3	3	66	642	426	778	172	118	118	28
17.....	8	3	13	59	590	426	470	160	108	118	28
18.....	13	3	8	52	564	404	426	138	108	98	28
19.....	13	3	8	45	516	382	448	138	98	82	28
20.....	10	3	13	52	540	404	470	128	82	82	24
21.....	8	3	16	66	564	470	382	118	66	74	19
22.....	13	13	24	52	516	516	342	108	74	66	19
23.....	13	13	28	52	448	723	448	118	66	59	19
24.....	13	13	28	66	382	833	426	98	66	45	19
25.....	13	3	28	82	362	998	426	98	66	38	19
26.....	13	3	28	98	426	943	516	98	66	52	19
27.....	13	3	28	90	426	888	516	118	66	52	19
28.....	13	3	38	108	238	998	342	118	66	38	19
29.....	13	3	28	138	224	943	306	138	66	28	19
30.....	13	28	138	270	888	306	138	66	28	19
31.....	13	28	426	470	118	19

Monthly discharge of St. Vrain Creek at Lyons, Colo., for 1912.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
January.....	13	3	7.42	456
February.....	13	3	6.00	345
March.....	38	3	13.0	799
April.....	138	19	64.1	3,810
May.....	642	138	353	21,700
June.....	998	342	629	37,400
July.....	998	306	536	33,000
August.....	470	98	175	10,800
September.....	118	66	84.8	5,050
October.....	138	19	66.2	4,070
November.....	45	19	27.3	1,620
The period.....	119,000

NOTE.—The above records have been changed slightly from the records of the State engineer to conform with the computing rules of the United States Geological Survey.

BOULDER CREEK AT ORODELL, COLO.

Location.—At Orodell station, in sec. 27, T. 1 N., R. 71 W., just below mouth of Fourmile Creek.

Records available.—March 18, 1907, to November 30, 1912. From May 14, 1895, to December, 1909, a station was maintained about 1 mile below the present site, chiefly by the State engineer. The records at the two points are not directly comparable, as some water is diverted for irrigation between. From 1902 to 1906 the records for the lower station were published only in the reports of the State engineer.

Drainage area.—108 square miles. (From State engineer's report.)

Gage.—Automatic recording gage installed by the Central Colorado Power Co.

Channel.—Not known, as only the computed records are furnished.

Discharge measurements.—Made from car and cable.

Winter flow.—Ice causes backwater during the winter months, and during that period discharge measurements are made to determine the flow.

Diversions.—There are no diversions from Boulder Creek above the station, but there are court decrees for diversions of 165 second-feet from tributaries entering above. Below the station there are decrees for diversions of 2,871 second-feet from Boulder Creek.

Cooperation.—Station maintained by the State engineer in cooperation with the Central Colorado Power Co., by whom the records are furnished.

Discharge measurements of Boulder Creek at Orodell, Colo., in 1912.

Date.	Hydrographer.	Gage height.	Dis-charge.	Date.	Hydrographer.	Gage height.	Dis-charge.
		<i>Feet.</i>	<i>Sec.-ft.</i>			<i>Feet.</i>	<i>Sec.-ft.</i>
Jan. 19	C. E. Turner.....	1.74	15	June 4	Grieve and Bundy.....	3.50	420
19	do.....	1.92	30	July 13	D. L. Bundy.....	3.55	442
Mar. 8	do.....	a 2.22	15	Aug. 10	do.....	2.75	145
Apr. 12	do.....	1.76	16	Sept. 23	do.....	2.45	96
May 16	Bunger and Bundy.....	2.60	118	Nov. 23	M. E. Bunger.....	2.05	23
16	C. E. Turner.....	2.60	119				

a Relation of gage height to discharge affected by ice.

Daily gage height, in feet, of Boulder Creek at Orodell, Colo., for 1912.

Day.	May.	July.	Aug.	Sept.	Oct.	Nov.	Day.	May.	July.	Aug.	Sept.	Oct.	Nov.
1					1.95	2.20	16		3.90		2.50		1.90
2			3.00		2.15	2.15	17		3.65		2.75		1.85
3			3.00		2.10	2.05	18		3.45		2.80		1.80
4			3.15	2.25	2.15	2.05	19	2.80	3.40		2.85		1.90
5			3.00	2.35	2.30	2.00	20	2.80	3.15			1.80	2.05
6			2.75	2.45	2.30	1.95	21	2.85	3.15		2.65	1.80	1.95
7			2.80	2.36	2.35	2.00	22	3.05	3.50		2.90	1.90	1.90
8			2.60	2.57	2.20	1.90	23	3.10	3.55		2.75	2.05	1.90
9			2.70	2.50	2.40	1.90	24	3.05	3.45		2.70	1.95	1.85
10			2.75	2.48	2.05	2.15	25	3.15	3.45		2.70	2.00	1.90
11					2.30	2.00	26		3.40		2.70	2.05	1.85
12					2.20	1.90	27		3.40		2.70	1.95	2.00
13						1.85	28		3.30			2.10	1.80
14		3.90				1.85	29		3.60			2.10	2.00
15		4.00		2.25		1.90	30		4.25		1.95	2.05	2.05
							31					2.10	

Daily discharge, in second-feet, of Boulder Creek at Orodell, Colo., for 1912.

Day.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1				62	268			57	32	57
2				68	200		214	77	51	51
3		21		76	290		214	45	45	40
4		21		70	410		268	64	51	40
5		18		21	430		214	77	70	36
6		30		23	157	460	147	92	70	32
7		21		20	170	383	157	78	77	36
8		22		22	247	430	117	112	57	27
9		23		25	267	453	371	137	84	27
10		21		28	238	450	394	147	40	51

Daily discharge, in second-feet, of Boulder Creek at Orodell, Colo., for 1912—Continued.

Day.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
11.....			20	241	438				70	36
12.....			34		385				57	27
13.....			19		375	603				24
14.....			14	57	272	630				24
15.....		8	16	110	363	684		64		27
16.....		11	10	130		630		100		27
17.....	22	3	11	153	287	495		147		24
18.....	34	6	11	155	182	394		157		20
19.....	34	11	8	157	170	371		170		27
20.....	28	32	10	157	242	268			20	40
21.....	57		10	170	206	268	57	127	20	32
22.....	51		10	231	204	418	59	184	27	27
23.....	18		11	248		443	66	147	40	27
24.....	28		21	231		394	72	137	32	24
25.....	22	8	26	268	384	394		137	36	27
26.....	6	3	15	126	362	371	100	137	40	24
27.....	6	3	26	128	375	371	77	137	32	36
28.....	6	3	40	104	400	328	54		45	20
29.....			45	107	365	468	68		45	36
30.....			50	145	485	820	54	32	40	40
31.....				268			40		45	

Monthly discharge of Boulder Creek at Orodell, Colo., for 1912.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
February (20 days).....			24.4	966
March (10 days).....			8.80	174
April (27 days).....			21.0	1,120
May (29 days).....			162	9,350
June (27 days).....			343	18,400
July (20 days).....			457	18,100
August (19 days).....			1.19	4,490
September (23 days).....			108	4,930
October (24 days).....			46.9	2,230
November (30 days).....			32.2	1,920

NOTE.—The above records have been changed slightly from the records of the State engineer to conform with the computing rules of the United States Geological Survey.

SOUTH BOULDER CREEK NEAR ROLLINSVILLE, COLO.

Location.—At highway bridge in sec. 35, T. 1 S., R. 73 W., 1 mile west of Rollinsville in the Pike National Forest. The nearest important tributary, Jennie Creek, enters 4 miles above.

Records available.—September 10, 1910, to November 17, 1912.

Drainage area.—39 square miles (measured from topographic sheets).

Gage.—Vertical staff.

Channel.—Fairly permanent.

Discharge measurements.—Made from bridge during high water and by wading at ordinary stages.

Winter flow.—Ice causes backwater during the winter months.

Diversions.—There are no court decrees for diversions above the station, and therefore it is probable that the records represent the natural run-off.

Accuracy.—Conditions are favorable for fairly accurate results and the estimates of discharge should be reliable.

Cooperation.—Station is maintained in cooperation with the United States Forest Service.

Discharge measurements of South Boulder Creek near Rollinsville, Colo., in 1912.

Date.	Hydrographer.	Gage height.	Discharge.	Date.	Hydrographer.	Gage height.	Discharge.
		<i>Feet.</i>	<i>Sec.-ft.</i>			<i>Feet.</i>	<i>Sec.-ft.</i>
Feb. 12 ^a	H. B. Waba.....	1.00	5.4	June 8	J. L. Mathias.....	3.15	388
Mar. 28 ^a	J. L. Mathias.....	1.10	5.8	Sept. 21	R. Richards.....	.99	15.9

^a Relation of gage height to discharge affected by ice.*Daily gage height, in feet, of South Boulder Creek near Rollinsville, Colo., for 1912.*

[Ray R. Clark, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1.....				1.1		2.3	2.9	1.85		1.05	1.0
2.....				1.1		2.7	2.65	1.8		1.0	
3.....		1.00				2.8		1.62	1.2		
4.....			1.0	1.9			2.6	1.62	1.2		
5.....	1.50	1.00				3.1		1.6	1.1	1.0	1.0
6.....		1.00	1.0		1.5	2.9	2.3	1.6	1.1	1.1	
7.....		1.00		2.8	1.4		2.4	1.6	1.08	1.12	.92
8.....	1.50		1.0		1.6	3.4	2.45	1.5		1.1	
9.....		1.00	1.0		1.6		2.6	1.35		1.05	
10.....						2.9	2.45		1.25	1.15	
11.....						2.7	2.35				.9
12.....	3.30	1.00					2.4	1.45	1.15		.85
13.....	3.30	1.00	1.1					1.45			
14.....	3.30	1.00	1.05			2.55		1.45	1.2	1.25	1.0
15.....	3.30	1.0	1.0					1.5		1.0	
16.....			1.1			2.8			1.15		.95
17.....	2.70	1.0				2.6			1.1	1.1	.8
18.....			1.1						1.1	1.05	
19.....	1.10										
20.....		1.05			1.9	2.3				1.0	
21.....		1.1	1.1		2.2	2.35		1.3	.95		
22.....	1.10		1.1			2.5					
23.....			1.0		2.1		2.05	1.25	1.05		
24.....	1.10 ¹	1.0	1.05		2.3		2.05		1.05	1.0	
25.....	1.10		1.0		2.5	3.2	1.8			1.0	
26.....	1.10						1.8	1.25	.98	1.0	
27.....		1.0			2.5	3.2		1.2	1.05	1.0	
28.....		1.0	1.1				1.8		1.05	1.0	
29.....	1.00	1.0	1.1	1.7	2.7	2.9		1.2		.9	
30.....			1.1	1.6	2.5	3.1			1.0		
31.....	1.00				2.6		1.9	1.2			

NOTE.—Ice present Jan. 1 to Apr. 7.

Daily discharge, in second-feet, of South Boulder Creek near Rollinsville, Colo., for 1911-12.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1911.								
1.....		25	156	102	45	40	23	31
2.....		30	163	112	42	41	24	32
3.....		36	170	121	40	44	24	33
4.....		41	170	130	35	48	24	34
5.....		43	170	160	40	31	25	35
6.....		64	170	190	46	30	26	35
7.....		68	170	150	51	29	27	30
8.....		73	173	130	45	27	27	26
9.....		97	176	126	42	27	27	25
10.....		97	180	122	40	26	42	25

Daily discharge, in second-feet, of South Boulder Creek near Rollinsville, Colo., for 1911-12—Continued.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1911.								
11		97	265	118	38	25	57	20
12		97	350	115	35	24	57	20
13		85	170	100	35	24	57	20
14		100	82	100	35	25	57	20
15		115	108	92	35	26	57	20
16	9	122	134	92	35	40	57	15
17	12	130	160	92	35	24	52	15
18	16	130	160	87	35	24	46	15
19	19	130	160	82	35	24	40	15
20	19	170	160	78	37	22	35	15
21	20	152	148	78	40	20	35	12
22	20	134	135	72	42	20	35	12
23	20	115	122	67	45	20	35	12
24	20	100	115	62	48	20	35	12
25	20	110	108	57	51	20	27	12
26	27	120	100	54	43	20	27	10
27	45	130	100	51	43	21	27	10
28	50	150	100	54	43	21	27	10
29	42	170	100	57	43	21	28	10
30	34	130	92	54	42	22	29	10
31		150		51	42		30	
1912.								
1		68	190	325	108	27	17	14
2		66	275	262	100	27	14	14
3		64	300	256	73	27	14	14
4		62	338	250	73	27	14	14
5		60	375	220	70	20	14	14
6		57	325	190	70	20	20	12
7		45	388	210	70	19	21	10
8		70	450	220	57	23	20	10
9		70	388	250	40	27	17	10
10		74	325	220	44	31	24	9
11		78	275	200	48	28	25	9
12		82	263	210	51	24	27	7
13		86	251	204	51	25	29	10
14		90	240	198	51	27	31	14
15		94	270	192	57	26	14	13
16		98	300	186	54	24	17	12
17		102	250	180	50	20	20	5
18		106	230	174	46	20	17	
19		110	210	168	42	18	16	
20		115	190	161	38	15	14	
21		170	200	154	35	12	14	
22		160	230	147	33	14	14	
23		150	286	140	31	17	14	
24		190	343	140	31	17	14	
25		230	400	100	31	15	14	
26		230	400	100	31	13	14	
27		230	400	100	27	17	14	
28		252	362	100	27	17	14	
29	85	275	325	105	27	16	9	
30	70	230	375	110	27	14	10	
31		250		115	27		12	

NOTE.—Discharge determined from a fairly well-defined rating curve. Discharge interpolated or estimated for days for which gage heights are missing. Mean discharge January, February, March, and December, 1911, estimated from discharge measurements. Mean discharge Apr. 1-15, 1911, estimated as 9 second-feet. Mean discharge January, February, March, April, and December, 1912, estimated from discharge measurements. Mean discharge Nov. 18-30, 1912, estimated as 6 second-feet. Discharge for 1911 revised since publication in Water-Supply Paper 306, in which discharge was given only for days on which gage was read.

Monthly discharge of South Boulder River near Rollinsville, Colo., for 1911-12.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accu- racy.
	Maximum.	Minimum.	Mean.		
1911.					
January.....			a 8.0	492	D.
February.....			a 8.1	450	D.
March.....			a 8.5	523	D.
April.....	50	9	16.9	1,010	B.
May.....	170	25	104	6,400	B.
June.....	350	92	152	9,040	B.
July.....	190	51	95.4	5,870	B.
August.....	48	35	40.8	2,510	B.
September.....	48	20	26.9	1,600	B.
October.....	57	23	36.1	2,220	B.
November.....	35	10	19.7	1,170	C.
December.....			a 8.5	523	D.
The year.....	350		43.7	31,800	
1912.					
January.....			a 6.5	400	D.
February.....			a 5.5	316	D.
March.....			a 6.0	369	D.
April.....			a 40	2,380	D.
May.....	275	45	128	7,870	B.
June.....	450	190	305	18,100	B.
July.....	325	100	180	11,100	C.
August.....	108	27	49.0	3,010	B.
September.....	31	12	20.9	1,240	B.
October.....	31	9.0	17.0	1,050	B.
November.....	14	5.0	9.4	559	C.
December.....			a 6.0	369	D.
The year.....	450		64.4	46,800	

a Estimated.

SOUTH BOULDER CREEK AT ELDORADO SPRINGS, COLO.¹

Location.—At the mouth of canyon at Eldorado Springs, in sec. 30, T. 1 S., R. 70 W., 3 miles southwest of Marshall. No important tributaries within several miles.

Records available.—May 15, 1895, to September 30, 1901; July 1, 1904, to November 30, 1912.

Drainage area.—125 square miles (measured from Eighteenth Annual Report, pt. 4, and topographic sheets).

Gage.—Vertical staff; datum unchanged.

Channel.—Not known, as only the computed estimates are received.

Discharge measurements.—Made by wading.

Winter flow.—Ice causes backwater during the winter months and measurements are made to determine the flow.

Diversions.—There are court decrees for diversions of 137 second-feet above the station and 1,658 second-feet below. There are also a number of flood-water decrees.

Cooperation.—Since 1904 the station has been maintained by the State engineer, by whom the records are furnished. The records for 1904-1908 were published only in the reports of the State engineer.

Discharge measurements of South Boulder Creek at Eldorado Springs, Colo., in 1912.

Date.	Hydrographer.	Gage height.	Dis-charge.	Date.	Hydrographer.	Gage height.	Dis-charge.
		<i>Feet.</i>	<i>Sec.-ft.</i>			<i>Feet.</i>	<i>Sec.-ft.</i>
Jan. 19	C. E. Turner.....	0.58	0.98	May 19	C. E. Turner.....	2.10	152
Mar. 8	do.....	.60	a 1.20	June 4	Thos. Grieve.....	2.45	253
Apr. 12	do.....	1.00	9.3	Aug. 10	D. L. Bundy.....	1.60	56
May 16	Bunger and Bundy....	1.20	19	Sept. 27	do.....	1.35	36

a Estimated.

¹ Called South Boulder near Marshall in 1910 report.

Daily gage height, in feet, of South Boulder Creek at Eldorado Springs, Colo., for 1912.

[B. E. Chesebro, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1.	0.95	1.00	0.60	1.10	1.05	2.10	2.80	2.15	1.35	1.30	1.05	1.10
2.	.90	1.00	.60	.70	1.05	2.20	2.50	2.10	1.30	1.30	1.20	1.05
3.	.90	1.00	.60	.90	1.05	2.45	2.40	2.00	1.30	1.25	1.30	1.05
4.	.75	1.00	.60	1.00	1.25	2.50	2.30	1.90	1.35	1.10	1.20	1.05
5.	.65	1.00	.60	1.00	1.45	2.60	2.15	1.85	1.30	1.00	1.30	1.00
6.	.60	1.00	.60	.95	1.45	2.70	2.05	1.80	1.25	1.00	1.10	.95
7.	.60	.95	.60	.90	1.55	2.55	2.10	1.80	1.20	1.00	1.30	1.05
8.	.60	.95	.60	.90	1.60	2.55	2.10	1.75	1.20	1.10	1.15
9.	.60	.95	.60	.90	1.70	2.50	2.10	1.70	1.30	1.00	1.20
10.	.80	.95	.60	.90	1.10	2.45	2.20	1.60	1.50	1.05	1.20
11.	.80	.95	.60	1.00	1.75	2.70	2.20	1.60	1.40	1.10	1.30
12.	.80	.95	.60	1.00	1.75	2.60	2.20	1.60	1.40	1.20	1.30
13.	.85	.95	.60	.90	1.25	2.60	2.25	1.60	1.30	1.35	1.10
14.	.85	.95	.60	.80	.90	2.50	2.45	1.60	1.40	1.35	1.20
15.	.90	.95	.95	.80	1.00	2.55	2.10	1.70	1.40	1.30	1.20
16.	.95	.95	.95	.80	1.35	2.45	2.10	1.70	1.40	1.35	1.25
17.	.95	.65	.95	.95	1.95	2.20	1.95	1.60	1.40	1.30	1.10
18.	.95	.65	.95	1.00	2.05	1.80	1.90	1.65	1.40	1.35	1.20
19.	.95	.65	.60	.85	2.10	1.70	1.85	1.60	1.35	1.40	1.20
20.	.95	.65	.60	.80	2.00	2.00	1.80	1.50	1.40	1.30	1.20
21.	.95	.65	.55	.80	2.15	2.30	1.80	1.50	1.40	1.40	1.20
22.	.95	.60	.50	.85	2.30	2.20	1.80	1.45	1.30	1.30	1.10
23.	.95	.60	.50	.85	2.30	2.50	2.10	1.45	1.30	1.40	1.10
24.	.95	.60	.50	.85	2.30	2.80	2.10	1.45	1.30	1.35	1.00
25.	.95	.60	.50	.85	2.35	3.10	2.10	1.40	1.30	1.35	1.10
26.	1.00	.60	.50	1.30	2.10	2.90	2.10	1.35	1.30	1.30	1.10
27.	1.00	.60	.55	1.30	2.50	2.90	2.10	1.35	1.30	1.30	.90
28.	1.00	.60	.55	1.00	2.50	3.00	2.10	1.30	1.30	1.30	1.10
29.	1.00	.60	.55	.95	2.55	2.90	2.00	1.35	1.30	1.30	1.20
30.	1.0055	1.05	2.45	3.00	2.00	1.35	1.30	1.30	1.20
31.	1.0095	2.45	2.10	1.45	1.30

NOTE.—Relation of gage height to discharge Jan. 1 to Feb. 10 affected by ice.

Daily discharge, in second-feet, of South Boulder Creek, at Eldorado Springs, Colo., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1.	7	3	1	13	11	152	380	166	29	25	11
2.	7	3	1	2	11	179	270	152	25	25	19
3.	7	3	1	5	11	254	237	127	25	22	25
4.	7	3	1	9	22	270	207	105	29	13	19
5.	7	3	1	9	38	304	166	95	25	9	25
6.	7	3	1	7	38	341	140	85	22	9	13
7.	7	5	1	5	49	287	152	85	19	9	25
8.	7	5	1	5	55	287	152	77	19	13	16
9.	7	5	1	5	69	270	152	69	25	9	19
10.	3	5	1	5	13	254	179	55	43	11	19
11.	3	7	1	9	77	341	179	55	33	13	25
12.	3	7	1	9	77	304	179	55	33	19	19
13.	2	7	1	5	22	304	193	55	25	29	13
14.	2	7	1	3	5	270	254	55	33	29	19
15.	2	7	7	3	9	287	152	69	33	25	19
16.	1	7	7	3	29	254	152	69	33	29	22
17.	1	1.2	7	7	116	179	116	55	33	25	13
18.	1	1.2	7	9	140	85	105	62	33	29	19
19.	1	1.2	1	4	152	69	95	55	29	33	19
20.	1	1.2	1	3	127	127	85	43	33	25	19
21.	1	1.2	.8	3	166	207	85	43	33	33	19
22.	1	1	.5	4	207	179	85	38	25	25	13
23.	1	1	.5	4	207	270	152	38	25	33	13
24.	1	1	.5	4	207	380	152	38	25	29	9
25.	1	1	.5	4	222	497	152	33	25	29	13
26.	3	1	.5	25	152	419	152	29	25	25	13
27.	3	1	.8	25	270	419	152	29	25	25	5
28.	3	1	.8	9	287	458	152	25	25	25	13
29.	3	1	.8	7	270	419	127	29	25	25	19
30.	38	11	254	458	127	29	25	25	19
31.	3	7.0	254	152	38	25

NOTE.—The above records are the flow of the South Boulder River below the headgate of Community canal, which diverts water just above this station.

Monthly discharge of South Boulder Creek at Eldorado Springs, Colo., for 1912.

Month.	Mean discharge in second-feet.	Run-off (total in acre-feet).	Month.	Mean discharge in second-feet.	Run-off (total in acre-feet).
January.....	3.4	209	August.....	63.0	3,870
February.....	5.9	339	September.....	28.0	1,670
March.....	8.1	498	October.....	23.0	1,410
April.....	40.0	2,380	November.....	17.0	1,010
May.....	204.0	12,500	The period.....		57,200
June.....	339.0	20,200			
July.....	213.0	13,100			

NOTE.—The above records have been changed slightly from the State engineer's records to conform with the computing rules of the U. S. Geological Survey. These estimates include the flow of Community canal.

CACHE LA POUDE RIVER AT MOUTH OF CANYON, NEAR FORT COLLINS, COLO.

Location.—In sec. 15, T. 8 N., R. 70 W., 3 miles below the intake of the Fort Collins waterworks, and 12 miles above Fort Collins; one-half mile above the mouth of Lewstone Creek.

Records available.—March 15, 1884, to October 15, 1901; February 3, 1910, to November 30, 1912.

Drainage area.—1,060 square miles.

Gage.—An automatic recording gage installed November 30, 1909; datum unchanged. No information available concerning the gage used from 1884 to 1901.

Channel.—Practically permanent.

Discharge measurements.—Made from car and cable.

Winter flow.—Ice causes backwater during the winter months and measurements are made to determine the flow.

Diversions.—There is a court decree for a diversion of 57 second-feet from Cache la Poudre River above the station and decrees for diversions of 526 second-feet from tributaries entering above, including Wyoming diversions. Below the station there are decrees for diversions of 3,105 second-feet from the river. In addition there are a number of decrees for flood-water diversions. There are also decrees for diversions of 688 second-feet from Laramie River, 121 second-feet from the headwaters of North Platte River and 525 second-feet from the headwaters of North Fork of Grand River to the headwaters of the Cache la Poudre.

Cooperation.—From 1884 to 1901 the records were maintained by Prof. L. G. Carpenter, of the Colorado State Agricultural College. Since 1910 the records have been furnished by the State engineer, by whom the station is maintained.

Discharge measurements of Cache la Poudre River at mouth of canyon, near Fort Collins, Colo., in 1912.

Date.	Hydrographer.	Gage height.	Dis-charge.	Date.	Hydrographer.	Gage height.	Dis-charge.
		<i>Feet.</i>	<i>Sec.-ft.</i>			<i>Feet.</i>	<i>Sec.-ft.</i>
Jan. 17	C. E. Turner.....	01.65	45	July 23	D. L. Bundy.....	2.80	1,270
Mar. 6do.....	01.18	56	Aug. 12do.....	1.85	381
Apr. 6do.....	1.06	73	Sept. 25do.....	1.45	213
May 14do.....	1.57	230	Nov. 22	M. E. Bunger.....	0.88	50
June 12	D. L. Bundy.....	3.98	2,600				

^a Relation of gage height to discharge affected by ice.

Daily gage height, in feet, of Cache la Poudre River at mouth of canyon, near Fort Collins, Colo., for 1912.

[T. R. McKnight, observer.]

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1.		0.85	2.00	3.45	3.40	2.70	1.65	1.35	.65
2.		.80	2.00	3.50	3.25	2.60	1.60	1.40	.60
3.		.85	1.70	3.75	3.25	2.50	1.50	1.60	.55
4.		.90	1.60	3.95	3.20	2.35	1.50	1.65	.70
5.		1.00	1.50	3.90	3.15	2.20	1.50	1.60	.65
6.		1.05	1.50	3.95	3.05	2.15	1.55	1.45	.60
7.		1.15		3.95	3.05	2.15	1.55	1.50	.65
8.				3.90	3.15	2.05	1.45	1.60	.65
9.			1.75	3.90	3.15	2.05	1.55	1.55	.60
10.			1.80	3.85	3.10	1.95	1.65	1.60	.60
11.			1.75	3.80	3.10	1.90	1.55	1.65	.85
12.			1.70	3.85	3.00	1.85	1.50	1.70	.80
13.			1.65	4.00	3.00	1.90	1.50	1.60	.70
14.		.75	1.55	4.10	3.05	1.85	1.55	1.55	.80
15.		.65	1.70	3.80	2.95	1.95	1.40	1.50	.80
16.		.70	2.05	3.65	2.80	1.90	1.45	1.55	.65
17.	1.10	.60	2.15	3.40	2.75	1.85	1.50	1.50	.50
18.	1.15	.60	2.35	3.05	2.70	1.75	1.60	1.35	.80
19.	1.10	.60	2.45	2.85	2.75	1.65	1.55	1.40	.90
20.	1.10	.90	2.50	2.90	2.80	1.70	1.60	1.40	.90
21.		.70	2.80	3.15	2.70	1.65	1.55	1.15	.90
22.		.60	2.95	3.20	2.60	1.65	1.35	1.00	.90
23.	1.00	.90	2.90	3.55	2.70	1.85	1.35	.90	.80
24.	.80	.90	2.85	3.70	2.65	1.80	1.40	.60	.75
25.	.80	1.00	3.20	3.75	2.70	1.75	1.40	.65	1.00
26.	.80	.90	3.35	3.80	2.75	1.65	1.35	.70	1.05
27.	.80	.90	3.25	4.20	3.05	1.55	1.40	.80	1.05
28.	.90	1.00	2.95	3.85	2.90	1.55	1.40	.90	1.05
29.	.90	1.00	3.10	3.75	2.70	1.55	1.35	.65	1.05
30.	.90	1.50	3.50	3.90	2.60	1.60	1.30	.60	1.05
31.	.95		3.80		2.60	1.70		.60	

Daily discharge, in second-feet, of Cache la Poudre River at mouth of canyon, near Fort Collins, Colo., for 1912.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1.	40	50	55	50	460	1,855	1,790	990	278	162	32
2.	40	50	55	45	460	1,920	1,598	900	255	180	30
3.	40	50	55	50	300	2,270	1,598	810	215	255	28
4.	40	50	55	55	255	2,555	1,535	695	215	278	35
5.	40	50	55	70	215	2,480	1,475	590	215	255	32
6.	40	50	55	80	215	2,555	1,358	555	235	198	30
7.	40	50	60	102	250	2,555	1,358	555	235	215	32
8.	40	50	65	95	290	2,480	1,475	490	198	255	32
9.	40	50	70	95	325	2,480	1,475	490	235	235	30
10.	40	50	75	90	350	2,410	1,415	430	278	255	30
11.	45	50	75	75	325	2,340	1,415	400	235	278	50
12.	45	50	75	60	300	2,410	1,300	375	215	300	45
13.	45	50	80	50	278	2,630	1,300	400	215	255	35
14.	45	50	90	40	235	2,780	1,358	375	235	235	45
15.	45	50	90	32	300	2,340	1,245	430	180	215	45
16.	45	55	90	35	490	2,130	1,090	400	198	235	32
17.	45	55	90	30	555	1,790	1,040	375	215	215	26
18.	45	55	102	30	695	1,358	990	325	255	162	45
19.	45	55	90	30	770	1,140	1,040	278	235	180	55
20.	45	55	90	55	810	1,190	1,090	300	255	180	55
21.	45	55	80	35	1,090	1,475	990	278	235	102	55
22.	45	55	75	30	1,245	1,535	900	278	162	70	55
23.	45	55	70	55	1,190	1,990	990	375	162	55	45
24.	45	55	45	55	1,140	2,200	945	350	180	30	40
25.	45	55	45	70	1,535	2,270	990	325	180	32	70
26.	45	55	45	55	1,725	2,340	1,040	278	162	35	80
27.	45	55	45	55	1,598	2,940	1,358	235	180	45	80
28.	45	55	55	70	1,245	2,410	1,190	235	180	55	80
29.	45	55	55	70	1,415	2,270	990	235	162	32	80
30.	45		55	215	1,920	2,480	900	255	145	30	80
31.	45		62		2,340		900	300		30	

NOTE.—Discharge Jan. 1 to Mar. 16 estimated on account of ice.* Discharge interpolated for other days for which gage heights are missing.

Monthly discharge of Cache la Poudre River at mouth of canyon, near Fort Collins, Colo., for 1912.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
January.....	45	40	43.4	2,670
February.....	55	50	52.4	3,010
March.....	102	45	67.9	4,180
April.....	215	30	62.6	3,720
May.....	2,340	215	785	48,300
June.....	2,940	1,140	2,190	130,000
July.....	1,790	900	1,230	75,600
August.....	990	235	429	26,400
September.....	278	145	212	12,600
October.....	300	30	163	10,000
November.....	80	26	47.0	2,800
The period.....				319,000

NOTE.—The above records have been changed slightly from the State engineer's records to conform with the computing rules of the United States Geological Survey.

LOUP RIVER AT COLUMBUS, NEBR.

Location.—At highway bridge in sec. 25, T. 17 N., R. 1 W., at Columbus. No tributaries between the station and the mouth of the river, 3 miles below.

Records available.—October 13, 1894, to November 30, 1912.

Drainage area.—13,500 square miles.

Gage.—A chain gage, installed at the highway bridge June 24, 1904, and set to read the same as the original vertical staff gage, which was located $1\frac{1}{2}$ miles above the bridge and was used from October 13, 1894, to that date. Owing to the slope of the river, however, the datum of the chain gage is 8.56 feet lower than that of the upper gage.

Channel.—Extremely shifting.

Discharge measurements.—Made from bridge.

Winter flow.—Ice causes backwater during the winter months and observations are discontinued.

Diversions.—Prior to September 1, 1912, there were approved diversions of 1,764 second-feet for irrigation and 4,700 second-feet for power from Loup River above the station. There are also approved diversions of 2,046 second-feet for irrigation and 3,130 second-feet for power from tributaries entering above.

Accuracy.—The extremely shifting channel makes the estimates of discharge only approximate.

Cooperation.—During 1912 the station was maintained in cooperation with the State engineer, by whom the field data were furnished.

Discharge measurements of Loup River at Columbus, Nebr., in 1912.

Date.	Hydrographer.	Gage height.	Dis-charge.	Date.	Hydrographer.	Gage height.	Dis-charge
		<i>Feet.</i>	<i>Sec.-ft.</i>			<i>Feet.</i>	<i>Sec.-ft.</i>
Apr. 26	C. G. Hrubesky.....	4.6	5,410	Aug. 29	D. P. Weeks, jr.....	4.35	1,650
May 31	C. T. Graham.....	4.5	2,480	Sept. 5do.....	4.5	2,120
June 19	D. P. Weeks, jr.....	4.65	4,100	Sept. 28do.....	4.45	2,730
July 27do.....	4.4	2,840	Oct. 6do.....	4.55	2,410
July 30do.....	4.4	2,050	Oct. 13do.....	4.8	3,140
10do.....	4.45	1,980	20do.....	4.6	3,110
20do.....	4.4	1,700	27do.....	4.65	2,660
23do.....	4.65	2,160	Nov. 2do.....	4.65	3,550
Aug. 3do.....	4.7	2,790	10do.....	4.50	2,140
9do.....	4.6	3,160	17do.....	4.50	3,070
14do.....	4.5	2,450	24do.....	4.45	2,700
21do.....	4.45	2,380	29do.....	4.40	2,580

Daily gage height, in feet, of Loup River at Columbus, Nebr., for 1912.

[W. D. Benson, observer.]

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1.....			4.4	4.3	4.5	4.35	4.5	4.55	4.5
2.....	5.5		4.35	4.25	4.55	4.4	4.4	4.6	4.5
3.....	5.4		4.45	4.3	4.6	4.45	4.25	4.6	4.55
4.....	5.3		4.45	4.8	4.5		4.45	4.55	4.6
5.....	5.2	4.8	4.5	4.4	4.5	4.5	4.4	4.6	-----
6.....	5.1	4.95			4.55	4.45	4.5	4.6	4.0
7.....	4.9	4.85		4.35	4.45	4.3		4.6	3.7
8.....	5.0	4.5			4.55	4.3	4.5	4.55	3.55
9.....	5.0	4.6	4.75	4.65	4.6	4.3	4.55	4.55	3.6
10.....	5.0	4.7	4.7	4.45	4.45	4.6	4.6	4.5	3.9
11.....	5.0	4.95	4.85	4.4	4.4	4.5	4.7	4.5	4.1
12.....	4.95	4.95	4.9	4.4	4.6	4.65	4.55	4.75	4.6
13.....	5.1	4.9	5.1	4.5	4.45	4.6	4.8		4.7
14.....	5.2	4.8	4.95	4.5	4.5		4.65	4.5	4.7
15.....	5.15	4.9	5.2	4.45	4.55	4.7	4.5	4.5	5.1
16.....	5.1	4.8	5.1	4.35	4.7	4.6	4.6	4.5	4.9
17.....	4.6	4.7	4.7	4.4	4.55	4.8	4.6	4.55	4.95
18.....	4.6	4.55	4.55	4.35	4.4	4.55	4.55	4.5	4.8
19.....		4.65	4.6	4.4	4.45	4.5	4.55	4.5	4.9
20.....		4.75	4.65	4.4	4.5	4.45	4.6	4.4	4.85
21.....	4.9	4.8	4.5	4.35	4.5	4.45	4.6	4.45	4.65
22.....	5.05	4.7	4.55	4.6	4.65	4.4	4.65	4.5	4.6
23.....	5.1	4.75	4.45		4.45	4.35	4.65		4.55
24.....	4.9	4.65	4.3	4.6	4.35	4.45	4.55	4.4	4.5
25.....	4.75	4.65	4.4	4.5	4.35	4.45	4.6	4.25	4.7
26.....	4.85	4.4	4.4	4.5	4.3	4.55	4.6	4.3	4.75
27.....	5.0	4.6	4.35		4.3	4.7	4.7	4.3	4.65
28.....	4.8		4.4	4.65	4.3	4.55	4.6	4.3	4.6
29.....	4.95	4.45	4.25	4.8	4.35	4.45		4.3	4.55
30.....	4.9	4.4	4.2	5.0	4.25	4.65	4.75	4.4	4.6
31.....		4.5		4.6	4.25		4.7		4.6

NOTE.—Relation of gage heights to discharge Dec. 1-31 affected by ice.

Daily discharge, in second-feet, of Loup River at Columbus, Nebr., for 1912.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1.....	14,400	7,760	1,900	1,610	1,650	1,670	2,700	2,600
2.....	14,400	7,470	1,560	1,180	1,900	1,600	2,100	3,550
3.....	13,400	7,180	2,170	1,350	2,170	1,750	1,200	3,150
4.....	12,400	6,890	2,170	4,600	1,650	1,920	2,050	2,300
5.....	11,400	6,600	2,450	1,700	1,650	2,100	1,600	3,150
6.....	10,400	6,100	3,030	1,620	2,300	1,850	2,410	3,000
7.....	8,420	7,150	3,610	1,550	2,170	1,200	2,130	3,000
8.....	9,420	3,730	4,190	2,250	2,800	1,200	1,850	2,400
9.....	9,420	4,010	4,760	2,950	3,150	1,200	1,900	2,400
10.....	9,420	5,170	4,850	2,650	2,170	2,980	2,160	2,140
11.....	9,420	7,750	5,770	1,800	1,900	2,200	2,500	2,400
12.....	8,920	7,750	6,280	1,800	3,160	3,800	1,650	3,900
13.....	10,400	7,210	8,100	2,310	2,170	3,400	3,140	3,300
14.....	11,400	6,160	6,550	2,310	2,450	3,800	2,450	2,700
15.....	10,900	7,210	8,620	2,050	2,800	4,200	1,650	2,700
16.....	10,400	5,800	8,500	1,300	3,930	3,400	2,450	3,050
17.....	5,410	4,900	4,650	1,500	2,800	5,100	2,450	3,070
18.....	5,410	3,620	3,450	1,300	2,100	3,050	2,500	3,050
19.....	6,410	4,450	3,800	1,500	2,400	3,070	2,500	3,050
20.....	7,420	5,330	4,100	1,500	2,700	2,730	3,110	2,400
21.....	8,420	5,800	2,960	1,300	2,700	2,730	2,900	2,750
22.....	9,920	4,350	3,450	1,900	3,800	2,400	3,200	3,050
23.....	10,400	4,770	2,730	1,900	2,400	2,120	2,950	2,880
24.....	8,420	3,940	1,860	1,900	1,850	2,750	2,150	2,700
25.....	6,900	3,940	2,400	1,430	1,850	2,750	2,320	1,650
26.....	7,920	2,200	2,560	1,430	1,450	3,450	2,320	1,900
27.....	9,420	3,550	2,250	1,800	1,450	4,650	2,660	1,900
28.....	7,030	2,860	2,560	2,170	1,450	3,450	2,600	2,000
29.....	8,550	2,180	1,730	3,200	1,550	2,750	3,170	2,580
30.....	8,060	1,900	1,200	5,190	1,250	4,220	3,750	2,580
31.....		2,450		2,160	1,250		3,350	

NOTE.—Discharge determined by indirect method for shifting channels. Discharge interpolated for days for which gage heights are missing.

Monthly discharge of Loup River at Columbus, Nebr., for 1912.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accu- racy.
	Maximum.	Minimum.	Mean.		
April.....	14,400	5,410	9,470	564,000	D.
May.....	7,760	1,900	5,190	319,000	D.
June.....	8,620	1,200	3,790	226,000	D.
July.....	5,180	1,300	2,020	124,000	D.
August.....	3,930	1,250	2,230	137,000	D.
September.....	5,100	1,200	2,780	165,000	D.
October.....	3,750	1,200	2,450	151,000	D.
November.....	3,900	1,650	2,710	161,000	D.
The period.....				1,850,000	

ELKHORN RIVER AT WATERLOO, NEBR.

Location.—At the highway bridge, one-half mile north of Waterloo, on the line between secs. 3 and 10, T. 15 N., R. 10 E. No tributary within several miles.

Records available.—May 19, 1911, to December 31, 1912.

Drainage area.—Not measured.

Gage.—Reference point on bridge from which distance to water surface is measured.

Channel.—Extremely shifting.

Discharge measurements.—Made from the highway bridge.

Winter flow.—No data.

Diversions.—Prior to September 1, 1912, there were approved diversions of 147 second-feet for irrigation and 538 second-feet for power from Elkhorn River above the station. From the tributaries entering above the Waterloo station there are approved diversions of 174 second-feet for power development.

Accuracy.—Daily discharge computed indirectly and can be considered only approximate.

Cooperation.—Station maintained by the State engineer, by whom the field data are furnished.

Discharge measurements of Elkhorn River at Waterloo, Nebr., in 1912.

Date.	Hydrographer.	Gage height.	Dis-charge.	Date.	Hydrographer.	Gage height.	Dis-charge.
		<i>Feet.</i>	<i>Sec.-ft.</i>			<i>Feet.</i>	<i>Sec.-ft.</i>
Apr. 29	C. G. Hrubesky.....	4.0	2,720	Sept. 6	D. P. Weeks, jr.....	1.6	720
May 30	C. T. Graham.....	2.3	878	15	do.....	1.35	739
June 21	D. P. Weeks, jr.....	1.9	1,110	21	do.....	1.2	598
28	do.....	1.4	930	28	do.....	1.2	600
July 5	do.....	1.1	785	Oct. 5	do.....	1.18	572
11	do.....	.5	653	12	do.....	1.8	852
19	do.....	.7	579	20	do.....	1.5	828
26	do.....	1.9	716	26	do.....	1.4	702
Aug. 2	do.....	1.25	598	Nov. 2	do.....	1.5	690
8	do.....	.85	583	9	do.....	1.5	500
13	do.....	1.3	747	16	do.....	2.4	1,035
23	do.....	3.1	1,540	24	do.....	1.7	643
28	do.....	1.45	735	Dec. 7	do.....	1.25	420

Daily gage height, in feet, of Elkhorn River at Waterloo, Nebr., for 1912.

[John Todd, observer.]

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1.		3.55	2.65	1.25	1.25	1.1	1.15	1.55	1.7
2.		3.5	2.25	1.15	1.3	1.1	1.15	1.5	1.7
3.		3.35	2.0	1.55	1.1	1.0	1.25	1.5	1.7
4.		3.35	1.95	1.4	1.05	1.25	1.2	1.5	1.7
5.		3.3	2.0	1.1	1.0	1.4	1.2	1.5	1.65
6.		3.25	1.95	1.05	.95	1.4	1.2	1.55	1.6
7.	8.05	3.2	2.0	1.0	.9	.95	1.2	1.5	1.7
8.	7.6	3.1	2.9	1.0	.9	.9	1.2	1.5	1.65
9.	7.0	3.05	2.6	.9	.9	.9	1.35	1.5	1.45
10.	6.35	3.2	2.35	.9	.95	1.1	1.35	1.55	2.05
11.	5.95	3.5	2.35	.9	1.25	1.2	1.45	1.5	1.9
12.	5.6	3.0	2.1	.85	2.25	1.1	1.8	1.5	1.85
13.	5.2	3.0	3.05	.8	1.25	1.1	1.75	1.85	2.2
14.	4.9	3.85	3.1	.75	1.2	1.2	1.8	2.15	2.2
15.	4.6	3.45	2.75	.8	1.25	1.35	1.85	2.25	2.05
16.	4.55	3.25	3.55	.8	1.85	1.35	1.95	2.4	2.05
17.	4.3	3.0	2.75	.85	1.7	1.6	1.85	2.2	2.05
18.	4.1	2.8	2.6	.8	1.4	1.4	1.8	2.05	2.1
19.	3.95	2.75	2.2	.75	2.9	1.3	1.6	1.9	2.1
20.	4.15	2.7	2.0	.8	3.4	1.25	1.55	1.8	2.15
21.	4.4	2.7	1.85	.9	3.4	1.15	1.5	1.8	2.25
22.	4.65	2.65	1.8	.85	3.2	1.1	1.5	1.75	2.25
23.	4.8	2.6	1.7	.85	3.2	1.05	1.45	1.7	2.25
24.	4.4	2.55	1.65	.9	3.2	1.05	1.45	1.75	2.2
25.	4.2	2.5	1.55	.95	3.05	1.1	1.45	1.75	2.2
26.	4.1	2.4	1.55	1.0	2.2	1.1	1.45	1.7	2.25
27.	3.95	2.35	1.45	1.15	1.6	1.1	1.5	1.7	2.15
28.	4.15	2.25	1.4	1.2	1.45	1.2	1.5	1.65	2.2
29.	4.0	2.35	1.35	1.05	1.25	1.2	1.45	1.7	2.2
30.	3.8	2.3	1.3	.95	1.15	1.2	1.5	1.65	2.25
31.		3.0		1.25	1.1		1.5		2.25

NOTE.—Relation of gage height to discharge Apr. 7-13 and Dec. 1-31 affected by ice.

Daily discharge, in second-feet, of Elkhorn River at Waterloo, Nebr., for 1912.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1.		2,090	1,230	855	630	580	560	700
2.		2,020	920	805	600	570	590	680
3.		1,840	795	1,030	565	510	595	660
4.		1,840	790	935	580	570	580	660
5.		1,770	795	785	590	700	580	620
6.		1,710	790	760	590	720	600	640
7.		1,660	795	730	585	460	600	580
8.		1,540	1,640	700	585	420	600	540
9.		1,490	1,390	670	585	440	650	500
10.		1,660	1,200	660	615	520	650	510
11.		2,020	1,200	655	725	580	680	520
12.		1,440	1,050	640	1,410	540	850	520
13.		1,440	1,920	625	745	540	820	680
14.	4,100	1,840	2,000	600	700	580	850	880
15.	3,620	1,960	1,690	620	745	660	920	940
16.	3,530	1,710	2,490	610	1,040	660	980	1,040
17.	3,200	1,440	1,750	620	950	810	970	900
18.	2,860	1,240	1,630	595	790	705	940	820
19.	2,660	1,200	1,280	580	1,340	655	870	740
20.	2,940	1,160	1,150	590	1,890	635	850	690
21.	3,300	1,160	1,110	660	1,840	600	780	690
22.	3,690	1,120	1,080	660	1,740	565	780	660
23.	3,940	1,080	1,020	660	1,540	540	760	640
24.	3,300	1,050	1,000	685	1,540	540	720	660
25.	3,010	1,010	960	700	1,440	565	720	660
26.	2,860	950	960	715	1,080	565	720	640
27.	2,660	920	940	775	810	565	715	640
28.	2,940	860	930	780	735	610	715	620
29.	2,720	920	910	665	640	610	690	640
30.	2,440	885	880	605	610	610	680	620
31.		1,450		680	590		680	

NOTE.—Discharge determined by indirect method for shifting channels. Mean discharge for December estimated from one discharge measurement.

Monthly discharge of Elkhorn River at Waterloo, Nebr., for 1912.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accu- racy.
	Maximum.	Minimum.	Mean.		
April 14-30.....	4,100	2,440	3,160	107,000	C.
May.....	2,090	860	1,430	87,900	C.
June.....	2,490	790	1,210	72,000	D.
July.....	1,030	580	698	42,900	D.
August.....	1,890	565	931	57,200	D.
September.....	720	420	588	35,000	D.
October.....	980	560	731	44,900	D.
November.....	1,040	500	676	40,200	D.
December.....			a 450	27,700	D.
The period.....				514,000	

a Estimated.

KANSAS RIVER BASIN.

REPUBLICAN RIVER AT BOSTWICK, NEBR.

Location.—At highway bridge, about 1 mile southwest of Bostwick, on the line between secs. 22 and 23, in T. 1 N., R. 8 W. Nearest tributary a small intermittent stream which enters a short distance below.

Records available.—June 6, 1904, to December 31, 1912. From June 20, 1896, to November 30, 1903, a station was maintained at Superior, 10 miles downstream. As there are no important tributaries nor diversions between, the records at the two points are very nearly comparable.

Drainage area.—23,300 square miles.

Gage.—Chain gage; datum unchanged.

Channel.—Shifting at intervals.

Discharge measurements.—Made from bridge.

Winter flow.—Ice causes backwater during the winter months and during that period the observations are discontinued.

Diversions.—Prior to September 1, 1912, there were approved diversions of 862 second-feet for irrigation and 150 second-feet for power from Republican River above the Bostwick station.

Accuracy.—Owing to the shifting channel the estimates can not be considered better than fair or possibly good.

Cooperation.—During 1912 this station was maintained in cooperation with the State engineer, by whom the field data were furnished.

Discharge measurements of Republican River at Bostwick, Nebr., in 1912.

Date.	Hydrographer.	Gage height.	Dis-charge.	Date.	Hydrographer.	Gage height.	Dis-charge.
		<i>Feet.</i>	<i>Sec.-ft.</i>			<i>Feet.</i>	<i>Sec.-ft.</i>
Apr. 22	C. G. Hrubesky.....	2.2	991	Aug. 16	D. P. Weeks, jr.....	5.0	4,290
May 28	C. T. Graham.....	1.7	536	Sept. 20do.....	1.7	431
June 16	L. W. Erickson.....	2.43	34.7	Oct. 19do.....	1.65	394
July 17	D. P. Weeks, jr.....	1.3	261	Nov. 23do.....	1.7	462

Daily gage height, in feet, of Republican River at Bostwick, Nebr., for 1912.

[I. W. Keifer, observer.]

Day.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1.....		3.8	4.5	2.0	1.4	1.8	2.3	1.9	1.3	1.6	1.7
2.....		3.8	4.2	2.0	1.4	1.8	2.1	1.7	1.4	1.6	1.7
3.....		3.8	3.8	2.8	1.4	1.7	1.9	1.6	1.4	1.6	1.7
4.....		3.8	3.5	2.7	1.3	1.6	1.7	1.5	1.3	1.6	1.7
5.....		3.8	3.2	3.2	1.3	1.6	1.6	1.5	1.3	1.6	1.7
6.....		3.8	3.0	3.0	1.2	1.9	2.7	1.4	1.3	1.6	1.7
7.....		3.8	2.9	2.3	1.2	1.6	3.2	1.3	1.3	1.6	1.8
8.....		3.8	2.8	2.3	1.2	1.5	4.8	1.3	1.3	1.6	2.3
9.....		2.8	2.7	2.2	1.2	1.4	2.8	1.2	1.3	1.6	2.0
10.....		2.8	2.6	2.2	2.7	1.3	2.6	1.1	1.3	1.7	3.2
11.....		2.8	2.5	2.7	2.6	1.3	2.4	1.4	1.6	1.7	3.0
12.....		2.8	2.5	2.7	3.6	1.7	2.5	1.3	1.4	1.7	3.2
13.....		2.8	4.5	2.3	3.0	1.6	2.3	1.4	1.4	1.6	3.0
14.....		2.8	2.4	2.0	2.9	1.5	2.4	1.2	1.4	1.8	2.8
15.....		2.5	2.3	2.0	2.9	1.4	2.4	1.2	1.8	1.8	2.7
16.....		2.5	2.3	2.2	2.4	1.3	4.8	1.2	2.1	1.8	2.7
17.....		2.6	2.2	2.0	2.8	1.3	2.7	1.2	1.9	1.9	2.5
18.....	2.6	2.9	2.2	2.0	2.8	1.2	2.4	1.2	1.8	1.8	2.5
19.....	2.2	3.3	2.1	1.9	2.7	1.2	2.3	1.2	1.7	1.7	2.7
20.....	2.2	9.5	2.0	1.8	2.6	1.2	2.4	1.7	1.6	1.7	3.0
21.....	2.1	10.3	2.2	1.8	2.6	1.2	2.4	1.6	1.6	1.7	3.0
22.....	2.2	10.05	2.2	1.7	2.5	1.1	2.4	1.6	1.5	1.7	2.9
23.....	2.5	9.85	2.2	1.7	2.2	1.1	2.4	1.5	1.5	1.7	2.8
24.....	2.6	9.6	2.0	1.7	2.1	1.1	2.4	1.5	1.5	1.7	2.7
25.....	2.6	8.88	2.0	1.7	2.1	1.2	3.4	1.4	1.6	1.7	2.7
26.....	3.4	5.8	2.2	1.7	2.1	1.2	3.0	1.4	1.5	1.7	2.6
27.....	3.4	6.3	2.1	1.7	2.1	1.4	2.7	1.4	1.6	1.7	2.6
28.....	3.8	6.5	2.0	1.6	2.2	1.4	2.4	1.4	1.6	1.7	2.5
29.....	3.8	6.3	2.0	1.5	2.1	1.3	2.2	1.4	1.5	1.7	2.4
30.....		5.4	2.0	1.5	1.9	2.3	2.1	1.4	1.5	1.7	2.5
31.....		4.8		1.5		2.7	2.0		1.5		2.5

NOTE.—Relation of gage height to discharge Feb. 26 to Mar. 25 affected by ice.

Daily discharge, in second-feet, of Republican River at Bostwick, Nebr., for 1912.

Day.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1.....		2,420	4,400	790	370	150	780	560	280	380	430
2.....		2,610	3,870	790	370	150	600	430	310	380	430
3.....		2,790	3,240	1,770	370	120	460	380	310	380	430
4.....		2,970	2,790	1,630	330	90	360	340	280	380	430
5.....		3,160	2,340	2,340	330	175	325	340	280	380	430
6.....		3,350	2,050	2,050	306	290	1,260	310	280	380	430
7.....		3,530	1,910	1,120	300	175	1,920	280	280	380	490
8.....		3,720	1,770	1,120	300	150	3,950	280	280	380	
9.....		3,900	1,630	1,000	300	135	1,550	260	280	380	
10.....		4,090	1,500	1,000	1,400	200	1,280	240	280	430	
11.....		4,270	1,370	1,630	1,000	200	1,030	310	380	430	
12.....		4,460	1,370	1,630	2,050	300	1,150	280	310	430	
13.....		4,640	4,400	1,120	1,020	265	920	310	310	380	
14.....		4,830	1,240	790	750	240	1,030	260	310	490	
15.....		5,010	1,120	790	580	275	1,030	260	490	490	
16.....		5,200	1,120	1,000	35	260	3,950	260	730	490	
17.....		5,380	1,000	790	280	260	1,410	260	560	560	
18.....	1,500	5,570	1,000	790	280	240	1,030	260	490	490	
19.....	1,000	5,760	890	700	200	240	920	260	430	430	
20.....	1,000	5,940	790	620	320	240	1,030	430	380	430	
21.....	890	6,120	1,000	620	320	240	1,030	380	380	430	
22.....	1,000	6,310	1,000	550	250	220	1,030	380	340	430	
23.....	1,370	6,490	1,000	550	80	220	1,030	340	340	430	
24.....	1,500	6,670	790	550	50	220	1,030	340	340	430	
25.....	1,500	6,860	790	550	160	240	2,200	310	380	430	
26.....	1,680	7,050	1,000	550	160	240	1,840	310	340	430	
27.....	1,870	8,200	890	550	160	280	1,410	310	380	430	
28.....	2,050	8,700	790	480	210	280	1,030	310	380	430	
29.....	2,240	8,200	790	420	160	260	820	310	340	430	
30.....		6,200	790	420	180	780	730	310	340	430	
31.....		5,000		420		1,260	640		340		

NOTE.—Discharge determined as follows: Feb. 18 to June 9, July 17 to Aug. 7, and Aug. 8 to Dec. 7, from three fairly well defined curves. June 10 to July 17, by the indirect method for shifting channels. Discharge interpolated Feb. 26 to Mar. 25. Discharge Dec. 8-31, estimated at 400 second-feet.

Monthly discharge of Republican River at Bostwick, Nebr., for 1912.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accu- racy.
	Maximum.	Minimum.	Mean.		
February 18-29.....	2,240	890	1,470	35,000	C.
March.....	8,700	2,420	5,140	316,000	D.
April.....	4,400	790	1,620	96,400	B.
May.....	2,340	420	940	57,800	B.
June.....	2,050	35	421	25,100	C.
July.....	1,260	90	271	16,700	C.
August.....	3,950	325	1,250	76,900	B.
September.....	560	240	320	19,000	B.
October.....	730	280	356	21,900	B.
November.....	560	380	426	25,300	B.
December.....			409	25,100	D.
The period.....				715,000	

BIG BLUE RIVER AT BEATRICE, NEBR.

Location.—At Sixth Street bridge at Beatrice, Nebr. Nearest tributary a small stream entering from the north a mile or more below.

Records available.—October 15, 1910, to December 31, 1912. Records of gage heights have been kept by the United States Weather Bureau from January 1 to July 31 of each year since June 1, 1905.

Drainage area.—3,363 square miles (United States Weather Bureau).

Gage.—Chain gage, which is owned by the United States Weather Bureau.

Channel.—Shifting.

Discharge measurements.—Made from bridge.

Winter flow.—Ice causes some backwater during a portion of the winter months.

Flood discharge.—The highest recorded stage was 25.6 feet above the present gage datum and occurred May 29, 1903.

Diversions.—Prior to September 1, 1912, there were approved diversions of 841 second-feet for power from the Big Blue above Beatrice. Below the station the approved diversions amount to 500 second-feet for power.

Accuracy.—Owing to the shifting channel the estimates have been obtained by the indirect method and can be considered only fair.

Cooperation.—Station maintained in cooperation with the State engineer, by whom the field data are furnished.

Discharge measurements of Big Blue River at Beatrice, Nebr., in 1912.

Date.	Hydrographer.	Gage height.	Dis-charge.	Date.	Hydrographer.	Gage height.	Dis-charge.
		<i>Feet.</i>	<i>Sec.-ft.</i>			<i>Feet.</i>	<i>Sec.-ft.</i>
Apr. 23	C. G. Hrubesky.....	2.9	983	Sept. 13	D. P. Weeks, Jr.....	1.5	289
May 29	C. T. Graham.....	1.7	496	Oct. 15do.....	3.2	1,250
June 17	Weeks and Roberts.....	2.4	636	Nov. 17do.....	1.5	284
July 18	D. P. Weeks, Jr.....	1.7	334	Dec. 14 ^ado.....	2.2	191
Aug. 17do.....	2.0	484				

^a Relation of gage height to discharge affected by ice.

Daily gage height, in feet, of Big Blue River at Beatrice, Nebr., for 1912.

[H. E. Palmer, observer.]

Day.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1.....			12.5	1.9	1.8	1.4	1.4	1.5	1.2	1.3	1.3
2.....			11.0	2.1	1.7	1.5	1.4	1.4	1.2	1.6	1.3
3.....			9.2	2.0	1.4	1.6	1.4	1.3	1.3	1.3	1.4
4.....			7.0	2.1	1.6	1.5	1.3	1.4	1.3	1.3	1.5
5.....			4.1	2.1	1.6	1.4	1.3	1.5	1.4	1.4	1.4
6.....			3.5	2.0	1.6	1.3	1.3	1.3	1.4	1.7	1.3
7.....			2.9	1.9	1.5	1.5	1.3	1.4	1.1	1.3	1.8
8.....			2.8	1.8	1.5	1.5	1.4	1.3	1.3	1.3	2.4
9.....			2.5	1.8	1.6	1.2	1.5	1.3	3.6	1.4	2.2
10.....			2.4	1.9	1.5	1.2	1.4	1.2	3.4	1.4	2.4
11.....			2.3	1.9	1.5	1.3	1.4	1.2	2.2	1.4	2.5
12.....			2.2	2.2	1.6	1.2	2.1	1.4	3.4	1.6
13.....		2.5	2.2	2.4	2.2	1.4	2.1	1.6	3.0	1.4	2.4
14.....		2.3	2.1	2.9	2.2	1.3	1.8	1.4	4.4	1.4	2.5
15.....			2.0	2.4	2.6	1.4	1.6	1.5	3.4	1.4	2.5
16.....			1.9	2.2	2.8	1.7	1.6	1.3	2.6	1.4	2.5
17.....	2.4	2.3	1.9	1.9	2.4	1.5	2.2	1.1	2.4	1.3	2.7
18.....	7.9	2.0	1.9	1.9	2.0	1.5	3.3	1.1	2.2	1.3	2.6
19.....	7.3	7.3	1.8	1.8	1.9	1.5	5.4	1.4	2.0	1.7	2.6
20.....	5.9	18.9	1.8	1.8	1.8	1.6	5.3	1.4	1.7	1.5	2.9
21.....	5.8	19.5	2.8	1.8	1.7	1.2	4.2	1.6	2.2	1.6	2.5
22.....	5.1	16.3	4.1	1.7	1.7	1.4	2.9	1.2	2.2	1.6	2.6
23.....	5.1	16.6	4.9	1.6	1.6	1.2	2.2	1.2	1.7	1.3	2.5
24.....	4.5	16.2	3.5	1.7	1.5	1.4	2.1	1.3	1.5	1.3	2.7
25.....	4.3	12.2	2.8	1.7	1.6	1.5	1.6	1.4	1.5	1.2	2.5
26.....	4.0	15.2	2.4	1.7	1.7	1.4	1.6	1.4	1.5	1.3	2.6
27.....		16.7	2.2	1.7	1.7	1.4	1.7	1.4	1.3	1.2	2.6
28.....		16.5	2.1	1.5	1.6	1.3	1.5	1.4	1.1	1.2	2.6
29.....		15.9	2.1	1.7	1.6	1.1	1.5	1.2	1.5	1.2	2.5
30.....		14.8	2.0	1.5	1.5	1.3	1.4	1.1	1.5	1.3	2.6
31.....		13.4	1.4	1.2	1.4	1.3	2.6

NOTE.—Relation of gage height to discharge, Dec. 15-31 affected by ice.

Daily discharge, in second-feet, of Big Blue River at Beatrice, Nebr., for 1912.

Day.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1.....			12,800	610	550	220	250	275	210	210	230
2.....			10,900	750	410	250	250	250	210	290	230
3.....			8,690	680	290	290	250	230	230	210	255
4.....			5,940	750	370	260	230	250	230	210	280
5.....			2,320	750	370	235	230	275	255	225	255
6.....			1,600	680	370	210	230	230	240	325	230
7.....			1,010	610	320	260	230	250	180	210	225
8.....			920	550	275	260	250	230	210	210	220
9.....			695	550	305	195	275	230	1,830	225	215
10.....			630	610	275	195	250	210	1,590	225	210
11.....			570	610	275	210	250	210	560	225	205
12.....			510	820	305	195	540	250	1,590	290	200
13.....		695	510	970	600	250	540	305	1,190	225	195
14.....		570	455	1,390	510	230	380	250	2,800	225	190
15.....		570	405	970	765	250	305	275	1,250	225
16.....		570	360	820	920	340	305	230	800	225
17.....	630	570	360	610	630	275	600	95	650	284
18.....	6,940	405	360	610	405	275	1,540	95	530	230
19.....	6,320	6,320	320	550	360	275	4,160	250	430	345
20.....	4,560	20,800	320	550	320	305	4,040	250	310	280
21.....	4,440	21,600	920	550	280	210	2,630	305	530	310
22.....	3,560	17,600	490	280	250	1,140	210	530	310
23.....	3,560	17,900	440	275	210	600	210	310	230
24.....	2,820	21,200	490	250	250	540	230	250	230
25.....	2,560	12,400	1,300	490	275	275	305	250	250	210
26.....	2,190	16,200	970	490	310	250	305	250	250	230
27.....		18,100	820	490	310	250	340	250	200	210
28.....		17,800	750	390	275	230	275	250	170	210
29.....		17,100	750	490	275	95	275	210	250	210
30.....		15,700	680	390	250	230	250	95	250	230
31.....		13,900	340	210	250	200

NOTE.—Discharge determined by indirect method for shifting channels. Discharge interpolated for days for which gage heights are missing. Discharge Dec. 15-31 estimated at 175 second-feet.

Monthly discharge of Big Blue River at Beatrice, Nebr., for 1912.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accu- racy.
	Maximum.	Minimum.	Mean.		
February (10 days).....			3,760	77,600	C.
March (19 days).....			11,600	437,000	C.
April (27 days).....			2,070	111,000	C.
May.....	1,390	340	629	38,700	C.
June.....	920	250	380	22,600	C.
July.....	340	95	240	14,800	C.
August.....	4,160	230	710	43,700	C.
September.....	305	95	230	13,700	C.
October.....	2,800	170	596	36,600	C.
November.....	345	210	242	14,400	C.
December.....	280		197	12,100	C.
The period.....				822,000	

LITTLE BLUE RIVER AT BLUE BLUFF, NEBR.

Location.—At highway bridge in sec. 20, T. 4 N., R. 6 W., 8 miles southwest of Edgar and $3\frac{1}{2}$ miles northwest of Angus, Nebr.

Records available.—July 16 to October 31, 1912.

Drainage area.—Not measured.

Gage.—Staff gage wired securely to downstream side of the east tube of the south pier of bridge.

Channel.—Shifting.

Discharge measurements.—Made from bridge.

Artificial control.—The dam of the Blue Bluff mill, formerly located about 150 feet above the gaging station, was washed out in the spring of 1912.

Diversions.—Prior to September 1, 1912, there were approved diversions of 180 second-feet for power from the Little Blue above Blue Bluff. There are no diversions from the tributaries entering above.

Accuracy.—Data insufficient for estimates of discharge.

Cooperation.—Station maintained in cooperation with the State engineer, by whom the field data are furnished.

Discharge measurements of Little Blue River at Blue Bluffs, Nebr., in 1912.

Date.	Hydrographer.	Gage height.	Dis-charge.	Date.	Hydrographer.	Gage height.	Dis-charge.
July 16	D. P. Weeks, jr.....	<i>Feet.</i>	<i>Sec.-ft.</i>	Oct. 19	D. P. Weeks, jr.....	<i>Feet.</i>	<i>Sec.-ft.</i>
Aug. 15do.....	0.85	65.2	Nov. 23do.....	0.80	80
Sept. 12do.....	.90	104			.90	85.2

Daily gage height, in feet, of Little Blue River at Blue Bluffs, Nebr., for 1912.

[R. T. Williams, observer.]

Day.	July.	Aug.	Sept.	Oct.	Day.	July.	Aug.	Sept.	Oct.
1.....		0.8	0.8	0.85	16.....	0.8		0.85	0.9
2.....		.8	.8	.9	17.....	.8		.85	.9
3.....		.8	.8	.9	18.....	.85		.85	.85
4.....		.8	.8	.9	19.....	.85		.85	.85
5.....		.8	.85	.85	20.....	.8		.85	.85
6.....		.75	.85	.9	21.....	.85		.85	.85
7.....		.75	.8	.85	22.....	.85		.85	.9
8.....		1.5	.8	.85	23.....	.85		.9	.85
9.....		1.45	.8	.85	24.....	.85		.9	.85
10.....		1.0	1.1	.95	25.....	1.0		.85	.85
11.....		.95	1.2	1.35	26.....	1.3	0.8	.85	.85
12.....		.9	1.1	1.1	27.....	1.0	.8	.9	.85
13.....		.85	.9	.95	28.....	.95	.8	.9	.85
14.....		.85	1.0	.9	29.....	.9	.8	.9	.85
15.....		.85	1.1	.85	30.....	.85	.8	.9	.85
					31.....	.8	.8		.85

LITTLE BLUE RIVER NEAR FAIRBURY, NEBR.

Location.—At highway bridge in sec. 26, T. 2 N., R. 2 E., $1\frac{1}{2}$ miles south of Fairbury.

Nearest tributary is a small stream entering half a mile above.

Records available.—May 23, 1908, to December 31, 1912.

Drainage area.—Not measured.

Gage.—Chain gage; datum unchanged.

Channel.—Shifting.

Discharge measurements.—Made from bridge.

Winter flow.—Ice causes backwater for only a short time during the winter months.

Artificial control.—The dam of the Fairbury Roller Mills, located 2 miles above, may control the flow to a certain extent during the low-water season, causing a daily fluctuation. The gage is read once each day.

Diversions.—Prior to September 1, 1912, there were no approved diversions from the Little Blue between Blue Bluff and Fairbury nor from the intervening tributaries. There was no diversion from Little Blue below Fairbury.

Accuracy.—Estimates have been made by indirect method for shifting channels and can be considered only fair.

Cooperation.—Station maintained in cooperation with the State engineer, by whom the field data are furnished.

Discharge measurements of Little Blue River near Fairbury, Nebr., in 1912.

Date.	Hydrographer.	Gage height.	Dis-charge.	Date.	Hydrographer.	Gage height.	Dis-charge.
		<i>Feet.</i>	<i>Sec.-ft.</i>			<i>Feet.</i>	<i>Sec.-ft.</i>
May 28	C. T. Graham.....	3.5	418	Sept. 13	D. P. Weeks, jr.....	3.2	229
June 18	D. P. Weeks, jr.....	3.6	360	Oct. 15	do.....	3.75	224
July 17	do.....	2.9	154	Nov. 19	do.....	3.1	195
Aug. 16	do.....	3.35	251	Dec. 14	do.....	2.55	193

Daily gage height, in feet, of Little Blue River near Fairbury, Nebr., for 1912.

Day.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1.....		3.9	6.7	4.5	3.2	3.0	2.7	3.1	2.9	3.1	3.0
2.....		3.8	6.0	3.7	3.1	3.0	2.7	3.0	2.9	3.0	2.9
3.....		3.6	5.5	3.6	3.4	3.1	2.8	3.0	2.8	3.0	2.9
4.....		3.6	5.1	3.8	3.1	3.0	2.7	2.9	2.9	3.0	3.0
5.....		3.7	4.9	4.2	3.2	3.0	2.7	2.8	2.8	3.1	3.1
6.....		3.8	4.6	4.0	4.2	2.9	2.8	2.9	2.8	3.0	2.9
7.....		3.4	4.4	4.2	3.2	2.9	5.2	3.2	2.8	3.1	3.3
8.....		3.6	4.3	3.9	3.1	3.0	5.3	2.9	3.0	3.0	3.0
9.....		3.7	4.1	3.7	3.4	3.0	3.8	2.8	6.9	3.1	3.4
10.....		3.6	4.0	3.6	3.8	3.0	4.0	2.9	4.7	3.0
11.....		3.3	3.9	4.1	3.6	2.9	3.9	2.8	5.9	3.0
12.....	3.7	3.4	3.8	5.1	3.8	2.8	3.5	2.8	9.4	3.2
13.....	4.5	3.6	3.8	4.6	4.0	2.8	3.3	3.3	5.4	3.1
14.....	3.5	3.2	3.7	4.2	6.8	2.8	3.2	3.3	4.4	3.0
15.....	3.6	3.1	3.6	4.0	4.9	2.8	3.6	3.2	3.9	3.0	2.7
16.....	3.4	3.2	4.4	3.7	4.1	2.7	3.5	3.1	3.5	3.1	2.6
17.....	4.7	3.2	3.8	3.6	3.8	2.8	7.7	3.0	3.4	3.1	3.0
18.....	6.1	3.5	3.7	3.5	3.6	2.8	7.7	2.9	3.3	3.2	3.0
19.....	6.7	6.7	3.6	3.4	3.5	2.9	7.4	3.0	3.3	3.1	3.1
20.....	6.8	12.2	3.7	3.3	3.4	2.8	4.6	4.7	3.2	3.1	2.4
21.....	5.7	12.6	5.5	3.3	3.4	2.8	4.3	4.1	3.3	3.2	2.9
22.....	5.0	11.0	5.2	3.3	3.3	2.9	5.8	3.3	3.3	3.0	2.8
23.....	4.6	12.3	4.5	3.2	3.3	2.7	4.9	3.1	3.2	3.1	2.6
24.....	4.1	10.9	4.0	3.2	3.2	2.7	4.0	3.0	3.2	3.0	2.5
25.....	3.8	8.6	3.8	3.2	3.2	2.8	3.6	3.0	3.2	3.1	2.7
26.....	4.7	10.7	3.7	3.1	3.1	2.8	3.4	3.0	3.2	3.1	2.8
27.....	4.2	11.6	3.5	3.3	3.1	2.8	3.3	2.8	3.0	3.1	2.8
28.....	4.1	10.7	3.8	4.3	3.1	2.9	3.2	3.1	3.2	3.0	2.7
29.....	4.0	9.8	3.8	3.4	3.1	3.0	3.1	2.9	3.1	2.9	2.9
30.....		8.4	3.6	3.2	3.1	2.8	3.1	2.8	3.1	3.0	2.9
31.....		7.4	3.1	2.8	3.0	3.2	2.8

Daily discharge, in second-feet, of Little Blue River near Fairbury, Nebr., for 1912.

Day.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1.....		525	1,920	755	345	200	135	215	160	160	215
2.....		495	1,500	465	325	200	135	200	160	150	200
3.....		440	1,220	440	390	215	145	200	150	150	200
4.....		440	1,020	495	325	200	135	190	160	150	215
5.....		465	930	635	345	200	135	180	150	160	220
6.....		495	795	560	635	190	145	190	150	150	195
7.....		390	715	635	345	165	590	230	150	160	245
8.....		440	675	525	325	175	620	190	145	150	215
9.....		465	595	465	390	175	340	180	1,300	160	260
10.....		440	560	440	495	175	380	190	440	150	246
11.....		365	525	595	440	165	360	180	860	150	232
12.....	465	390	495	1,020	495	155	280	180	2,800	170	219
13.....	755	440	495	795	560	155	245	245	660	160	206
14.....	415	345	465	635	1,800	140	230	245	360	150	193
15.....	440	325	440	560	780	140	300	230	250	150	210
16.....	390	345	715	465	500	130	280	215	180	160	200
17.....	840	345	495	440	410	140	2,100	200	165	160	250
18.....	1,560	415	465	415	360	140	2,100	190	150	170	250
19.....	1,920	1,920	440	390	340	150	1,920	200	150	200	265
20.....	1,980	5,220	465	365	320	140	545	580	140	200	170
21.....	1,330	5,460	1,220	365	320	140	455	405	150	215	240
22.....	975	4,500	1,070	365	300	150	1,040	245	150	190	220
23.....	795	5,280	755	345	270	130	650	215	140	200	200
24.....	595	4,440	560	345	255	135	380	200	140	190	205
25.....	495	3,060	495	345	255	145	300	200	140	200	210
26.....	840	4,320	465	325	240	145	260	200	140	200	220
27.....	635	4,560	415	365	240	145	245	180	115	200	220
28.....	595	4,320	495	675	240	155	230	215	140	190	210
29.....	560	3,780	495	390	240	165	215	190	130	200	240
30.....		2,940	440	345	215	145	215	180	130	215	240
31.....		2,340	325	145	200	140	220

NOTE.—Discharge determined by indirect method for shifting channels. Discharge interpolated for days for which gage heights are missing.

Monthly discharge of Little Blue River near Fairbury, Nebr., for 1912.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accu- racy.
	Maximum.	Minimum.	Mean.		
February 12-29.....	1,980	390	865	30,900	C.
March.....	5,460	325	1,930	119,000	C.
April.....	1,920	415	711	42,300	C.
May.....	1,020	325	492	30,300	C.
June.....	1,800	215	416	24,800	C.
July.....	215	130	159	9,780	C.
August.....	2,100	135	493	30,300	C.
September.....	580	180	222	13,200	C.
October.....	2,860	115	331	20,400	C.
November.....	215	150	174	10,400	C.
December.....	265	170	220	13,500	C.
The period.....				345,000	

MISCELLANEOUS MEASUREMENTS.

The following table gives the results of measurements made at points other than regular gaging stations in the Missouri River basin in 1912:

Miscellaneous measurements in Missouri River drainage basin in 1912.

Date.	Stream.	Tributary to—	Locality.	Gage height.	Dis- charge.
				<i>Feet.</i>	<i>Sec.-ft.</i>
Apr. 25	Muskrat Creek.....	Boulder River.....	On section line between secs. 10 and 11, T. 6 N., R. 4 W., near Boulder, Mont.	5.0
Mar. 30	North Fork of Sun River.....	Sun River.....	Sun River canyon near Augusta, Mont.	159
Aug. 21	Francis Creek.....	North Fork of Sun River.....	NW. $\frac{1}{4}$ SW. $\frac{1}{4}$ sec. 29, T. 22 N., R. 8 W., near Au- gusta, Mont.	a 1.0
21	Richardson Creek.....	do.....	SW. $\frac{1}{4}$ SE. $\frac{1}{4}$ sec. 29, T. 22 N., R. 8 W., near Au- gusta, Mont.	a 0.2
13	Breed Creek.....	Willow Creek.....	Mouth, near Augusta, Mont.	0.2
13	Witmer Lake overflow.....	do.....	SW. $\frac{1}{4}$ NE. $\frac{1}{4}$ sec. 23, T. 20 N., R. 8 W., near Au- gusta, Mont.	a 0.1
July 5	Buckholtz Springs.....	do.....	SE. $\frac{1}{4}$ SW. $\frac{1}{4}$ sec. 28, T. 21 N., R. 7 W., near Au- gusta, Mont.	1.1
3	Little Willow Creek.....	do.....	SW. $\frac{1}{4}$ NW. $\frac{1}{4}$ sec. 10, T. 20 N., R. 8 W., near Au- gusta, Mont.	5.5
3	Cutrock Creek.....	Little Willow Creek.....	NE. $\frac{1}{4}$ SE. $\frac{1}{4}$ sec. 3, T. 20 N., R. 8 W., near Augusta, Mont.	3.5
2	Spring Coulee.....	Cutrock Creek.....	SW. $\frac{1}{4}$ NW. $\frac{1}{4}$ sec. 34, T. 21 N., R. 8 W., near Au- gusta, Mont.	a 1.0
1	Barr Creek.....	Little Willow Creek.....	SE. $\frac{1}{4}$ SE. $\frac{1}{4}$ sec. 22, T. 21 N., R. 8 W., near Augusta, Mont.	7.1
3	Furnam Creek.....	Barr Creek.....	SW. $\frac{1}{4}$ SE. $\frac{1}{4}$ sec. 27, T. 21 N., R. 8 W., near Au- gusta, Mont.	5.8
Aug. 15	do.....	do.....	do.....	1.3
23	Duval Creek.....	Smith Creek.....	SE. $\frac{1}{4}$ NW. $\frac{1}{4}$ sec. 6, T. 19 N., R. 7 W., near Augusta, Mont.	a 0.5
10	Smith Lake overflow.....	do.....	NW. $\frac{1}{4}$ NW. $\frac{1}{4}$ sec. 8, T. 19 N., R. 7 W., near Au- gusta, Mont.	0.0

a Estimated.

Miscellaneous measurements in Missouri River drainage basin in 1912—Continued.

Date.	Stream.	Tributary to—	Locality.	Gage height.	Dis-charge.
June 27	Elk Creek.....	Dubray Creek.....	SE $\frac{1}{4}$ NE $\frac{1}{4}$ sec. 28, T. 19 N., R. 7 W., near Augusta, Mont.	Feet.	Sec.-ft. 24.1
Aug. 9do.....do.....do.....	10.0
June 25	Hay Coulee.....	Elk Creek.....	NW $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 28, T. 19 N., R. 7 W., at its mouth, near Augusta, Mont.	a 1.0
25	Crane Creek.....	Hay Coulee.....	SE $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 3, T. 18 N., R. 7 W., near Augusta, Mont.	a 0.25
Aug. 6do.....do.....	NW $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 3, T. 18 N., R. 7 W., near Augusta, Mont.	a 0.12
June 27	Faulkner Creek.....	Elk Creek.....	Head of M. Connor's ditch, near Augusta, Mont.	a 0.5
26	Goss Creek.....	Dubray Creek.....	SW $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 15, T. 19 N., R. 8 W., near Augusta, Mont.	5.5
Aug. 10do.....do.....do.....	1.1
10	West Creek.....	Goss Creek.....	Near Augusta, Mont.	a 0.5
June 19	Hogan Slough.....	(b).....	SW $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 20, T. 20 N., R. 6 W., near Au- gusta, Mont.	c 14.9
22do.....	(b).....	SW $\frac{1}{4}$ NE $\frac{1}{4}$ sec. 10, T. 20 N., R. 6 W., near Au- gusta, Mont.	c 1.6
18	Spring Creek.....	Sun River.....	SW $\frac{1}{4}$ NW $\frac{1}{4}$ sec. 8, T. 20 N., R. 5 W., near Au- gusta, Mont.	a 0.2
July 31	Dry Creek.....do.....	SE $\frac{1}{4}$ NW $\frac{1}{4}$ sec. 11, T. 19 N., R. 6 W., near Au- gusta, Mont.	a 1.0
26do.....do.....	NW $\frac{1}{4}$ NW $\frac{1}{4}$ sec. 35, T. 20 N., R. 5 W., near Simms, Mont.	a 1.0
June 10	Simms Creek.....	Sun River.....	NE $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 20, T. 20 N., R. 3 W., near Simms, Mont.	a 0.25
10do.....do.....	SW $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 15, T. 20 N., R. 3 W., near Simms, Mont.	a 5.6
Sept. 14	Giant Springs.....	Missouri River.....	Great Falls, Mont.	192
Apr. 9	Sheep Creek.....	Dupuyer Creek.....	Sec. 6, T. 28 N., R. 7 W., near Dupuyer, Mont.	42.2
May 6do.....do.....do.....	20
Apr. 7	Checkerboard Creek.....	Musselshell River.....	Delphine, Mont.	7.2
8	American Fork.....do.....	Harlowton, Mont.	e 1.16	3.7
Aug. 25	South Fork of Milk River.....	Missouri River.....	Mackey's ranch, near Kim- ball, Alberta, Canada.	21
Apr. 10	Milk River.....	Missouri River.....	Vandalia, Mont.	720,900
May 6	Peoples Creek.....	Milk River.....	Near Dodson, Mont.	688
24do.....do.....do.....	292
June 17do.....do.....do.....	214
May 7	Alkali Creek.....do.....	Near Malta, Mont.	584
Apr. 20	Frenchman Creek.....do.....	Highway bridge near the mouth and near Saco, Mont.	3,520
7	Beaver Creek.....do.....	Highway bridge near its mouth and near Hins- dale, Mont.	a 1,290
Apr. 2	Rock Creek.....do.....do.....	475
18do.....do.....do.....	1,060
June 17	Schultz and Ereaux canal.....do.....	Near Dodson, Mont.	7.2
Apr. 12	Poplar River.....	Missouri River.....	Obershaw's ranch, near Poplar, Mont.	7.5	3,380

a Estimated.

b This is an old overflow channel of South Fork of Sun River which has been dammed and is used to carry water for irrigation.

c The difference between the measurements of Hogan Slough on June 19 and June 22 shows the approximate amount being used for irrigation.

d The difference between this measurement and the first one represents waste water from irrigation. The first measurements show the total run-off from Simms Creek drainage.

e Made at old gaging station.

f There was also an overflow section of 2,690 square feet, with an average velocity of not over 2 feet per second.

g There was also a large overflow section not included.

Miscellaneous measurements in Missouri River drainage basin in 1912—Continued.

Date.	Stream.	Tributary to—	Locality.	Gage height.	Discharge.
				<i>Feet.</i>	<i>Sec.-ft.</i>
Sept. 5	West Fork of Rosebud River.	Rosebud River.....	Below Mystic Lake, near Absarokee, Mont.		157
5	do.	do.	Absarokee, Mont.		160
4	East Fork of Rosebud River.	do.	do.		134
Jan. 31	Clark Fork	Yellowstone River	Northern line of Yellowstone National Park.		7.5
31	Republic Creek	Lamar River	Cooke City, Mont.		1.6
May 26	Popo Agie River.	Big Horn River.	Alapahoe, Wyo.		1,200
June 27	do.	do.	do.		2,470
July 24	do.	do.	do.		623
Aug. 29	do.	do.	do.		316
Oct. 26	do.	do.	do.		287
Aug. 22	Niobrara River	Missouri River	Carns, Nebr.		1,280
May 17	North Platte River	do.	Bayard, Nebr.	2.25	3,530
20	do.	do.	do.	2.2	3,330
15	do.	do.	Bridgeport, Nebr.	1.9	4,710
21	do.	do.	do.	1.75	3,070
30	do.	do.	do.	1.4	1,630
June 8	do.	do.	do.	1.0	394
15	do.	do.	do.	1.6	2,540
24	do.	do.	do.	1.62	2,390
26	do.	do.	do.	1.55	2,020
27	do.	do.	do.	1.47	1,890
July 10	do.	do.	do.	1.58	2,190
23	do.	do.	do.	2.25	6,380
Oct. 11	do.	do.	do.		6,720
July 15	Lake Spring Creek.	North Platte River	4 miles northeast of Saratoga, Wyo.		2.2
Feb. 7	Deer Creek	do.	Mouth, near Glenrock, Wyo.		a 7.0
Mar. 12	do.	do.	do.		a 10.0
May 25	do.	do.	do.		a 200
28	do.	do.	do.		a 250
June 28	do.	do.	do.		a 6
July 23	do.	do.	do.		a 3
Aug. 28	do.	do.	do.		a 4
Oct. 25	do.	do.	do.		a 35
Feb. 7	Boxelder Creek	do.	Mouth, near Careyhurst, Wyo.		a 4
Mar. 12	do.	do.	do.		a 8.0
May 28	do.	do.	do.		a 75
June 28	do.	do.	do.		a 3.0
July 23	do.	do.	do.		a 2.0
Aug. 28	do.	do.	do.		a 2.0
Oct. 25	do.	do.	do.		a 20.0
Feb. 7	La Prele Creek	do.	Mouth, near Douglas, Wyo.		a 2.0
Mar. 12	do.	do.	do.		a 10.0
May 25	do.	do.	do.		a 150
28	do.	do.	do.		a 150
June 28	do.	do.	do.		a 1.0
July 23	do.	do.	do.		a 1.0
Aug. 28	do.	do.	do.		a 1.0
Oct. 25	do.	do.	do.		a 4.0
Feb. 7	Horse Shoe Creek	do.	Mouth, near Hauf's Spur, Wyo.		a 2.0
Mar. 12	do.	do.	do.		a 1.5
May 25	do.	do.	do.		a 75.0
28	do.	do.	do.		a 75.0
June 28	do.	do.	do.		a 2.0
July 23	do.	do.	do.		a 2.0
Aug. 28	do.	do.	do.		a 1.5
Oct. 25	do.	do.	do.		a 20.0
Feb. 7	Cottonwood Creek	do.	Mouth, near Wendover, Wyo.		a 1.0
Mar. 12	do.	do.	do.		a 1.5
May 25	do.	do.	do.		a 15
28	do.	do.	do.		a 6.0
June 28	do.	do.	do.		a 1.0
July 23	do.	do.	do.		a 1.0
Aug. 28	do.	do.	do.		a 1.0
Oct. 25	do.	do.	do.		a 4.0
Feb. 15	Laramie River	do.	6 miles above Uva, Wyo.		a 30.0
Mar. 15	do.	do.	500 feet above mouth of North Laramie River, near Uva, Wyo.		54.9
May 21	North Laramie River Land Co.'s irrigation ditch.	North Larime River.	Near Uva, Wyo.		53.8

a Estimated.

Miscellaneous measurements in Missouri River drainage basin in 1912—Continued.

Date.	Stream.	Tributary to—	Locality.	Gage height.	Discharge.
				<i>Feet.</i>	<i>Sec.-ft.</i>
Jan. 4	North Fork of South Platte River.	South Platte River....	South Platte, Colo.		24.2
29	do.	do.	do.		32.8
Feb. 27	do.	do.	do.		33.2
Apr. 29	do.	do.	do.	1.85	84.4
June 1	do.	do.	do.	3.50	620
Oct. 23	do.	do.	do.	2.00	137
Jan. 10	Geneva Creek.....	North Fork of South Platte River.	Sullivan's ranch, near Grant, Colo.		9.6
Mar. 6	do.	do.	do.		9.7
6	do.	do.	do.		11.4
Apr. 8	do.	do.	do.55	20.6
May 16	do.	do.	do.69	28.2
June 16	do.	do.	do.	1.48	274
Sept. 19	South Fork of South Platte River.	South Platte River....	Inlet to Lake George.		a 25
May 21	Clear Creek.....	do.	Above mouth of North Clear Creek, Golden, Colo.		249
Mar. 8	Soda Creek.....	Clear Creek.....	Idaho Springs, Colo.		a.5
8	North Clear Creek.....	do.	Forkscreek, Colo.		a 2.0
May 21	do.	do.	do.		92
Apr. 27	Tuckers Gulch.....	do.	Golden, Colo.		a.5
Nov. 29	West Fork of Blue River.	Blue River.....	Golden, Nebr.		118
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a Estimated.

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